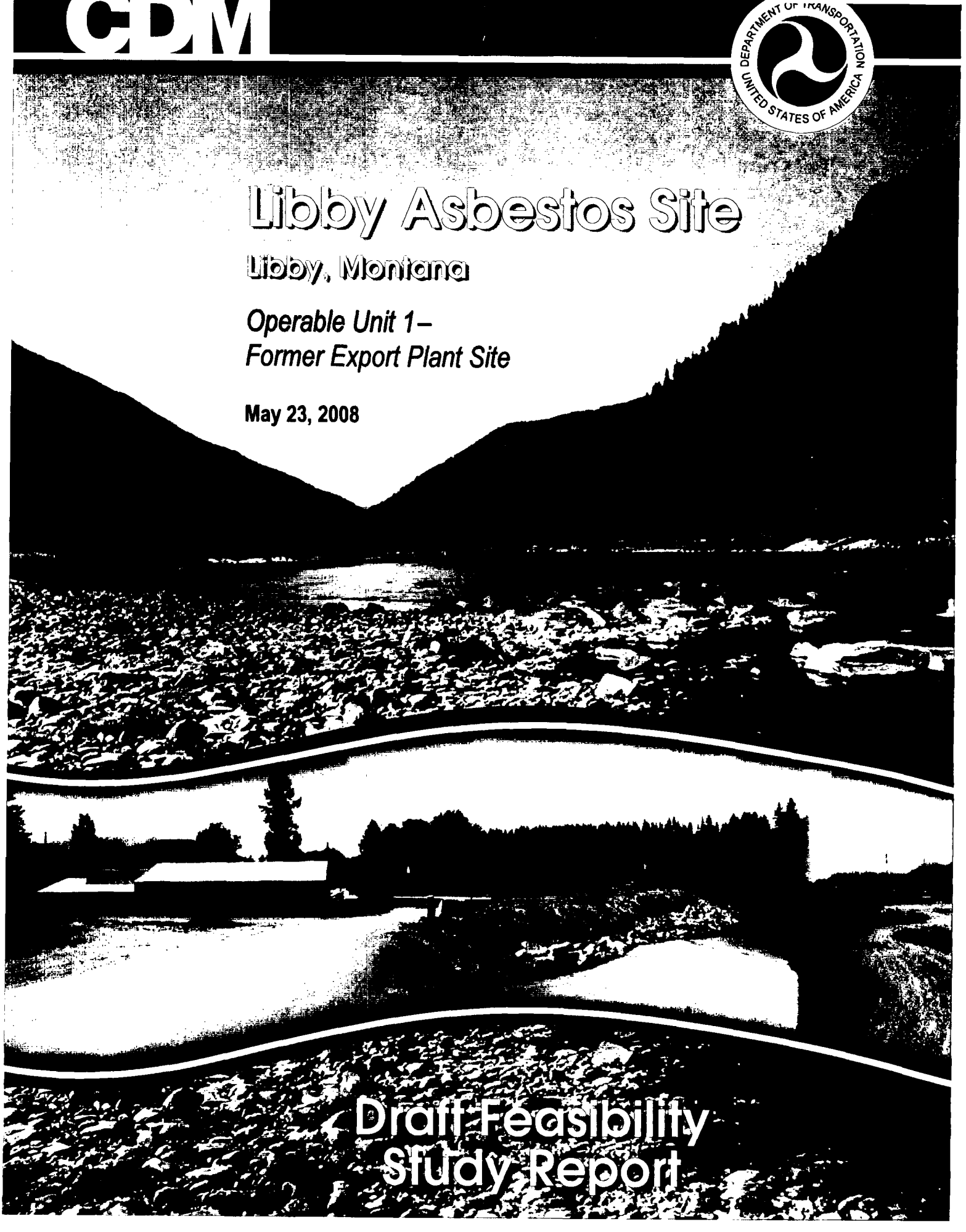
CDM



Libby Asbestos Site

Libby, Montana

Operable Unit 1–
Former Export Plant Site

May 23, 2008

Draft Feasibility Study Report

CDM

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May 23, 2008

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Subject: Draft Feasibility Study, Operable Unit (OU) 1, Former Export Plant, Libby Asbestos Site

Dear Mr. Peronard, Ms. Hernandez, and Mr. Raney:

CDM is pleased to submit for your review the Draft Feasibility Study (FS) for OU1. This document was completed in accordance with *"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", EPA/540/G-89/004 (OSWER 9355.3-01), "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study"*, EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

To facilitate review of the document, an electronic version of the text will be provided. Please note, only the hard copy version of the document will be considered the official deliverable.

In order for CDM to be able to produce the next version of the FS (Final Draft) by the current due date of June 27th, CDM will need to receive all stakeholder comments no later than June 17th.

Key assumptions were applied to the Draft FS, and are summarized below with details in Exhibits 5-1 and 7-1 of the Draft FS. Several of these assumptions may require additional direction from EPA to resolve prior to delivery for the next version (Final Draft) of the document:

- ***Land Use is Considered to be Recreational (Non-Residential)***
  Land use for Area 1 (Former Export Plant) and Area 2 (Riverside Park) is assumed to be recreational under all remedial alternatives except for Alternative 2. Alternative 2 assumes the areas are excluded from human access and use.

- ***Exclusion of Risks from Alternative Evaluations***
  The BLRA and SLERA for OU1 are currently being prepared by EPA and SRC; thus, it is not possible to quantitatively assess the site's risks to human and ecological receptors at this time. This evaluation will occur in a future version of this document once the BLRA and SLERA for OU1 is available. The draft FS assumes that the areas pose potential current and/or future risks to human receptors from exposure to asbestos fibers in surface soils.

- ***Remedial Action would Include All of Area 1 and Area 2 of the Site***
  It is assumed that due to high variability and uncertainty in the extent of contamination, LA detection vs. non-detection and visible vs. no visible vermiculite through out the site, the implementation of remedial action would include all of Area 1 (Former Export Plant) and Area 2 (Riverside Park).

- ***Comprehensive Approach of GRAs within Alternatives***
  The GRAs provided within the alternatives address the contaminated soils and risks for the site as a whole, i.e. a separate approach for Area 1 and Area 2 was not taken for alternatives evaluation.

- ***Institutional Controls and Monitoring are Essential GRA Components of all Alternatives***
  Because of the potential future land uses described in Section 3, institutional controls would be required to prevent or restrict any activity or use that might pose a risk or compromise a remedy component due to the land uses. Monitoring would be required to ensure that the remedy components are not compromised and that institutional controls are being adhered to.

- ***Monitoring Used to Determine Protectiveness and Need for Additional Remedial Measures***
  There is a possibility that the subsurface contaminated soils remaining in place below remedy components could be exposed in the future if the remedy components are disturbed or compromised after the implementation of a remedy.

  Based on the assumed exposure risk to human receptors, it is assumed that monitoring (consisting of inspections) will be performed to determine protectiveness of the remedy after implementation and the need for any future additional remedial measures. These additional remedial measures are excluded from the screening and evaluation of remedial alternatives since they would be a contingency measure.

- ***30-year Period of Evaluation for all Alternatives***
  It is likely that all remedial alternatives will require an indefinite duration of operations and maintenance due to implementation of institutional controls and monitoring. However, evaluation of long durations of operations and maintenance is cumbersome and is generally not necessary for comparative evaluation between alternatives due to cost discounting under present value analysis. Thus, a default 30-year period of evaluation has been selected for all remedial alternatives.

- ***Remedy Component Assumptions for Covers and Excavation/Disposal Consistent with Previous Interim Remedial Actions Performed for the Libby Asbestos Superfund Site***
  Numerous removal actions and interim remedial actions have been performed for other operable units at the Libby Asbestos Site to address contamination posing an imminent risk to human health and the environment. It is assumed that remedy components such as covers or excavation/disposal of contaminated soil will be consistent with the protocol developed for these previous actions. It is assumed for Alternative 3 that the thickness of the soil cover would be 18 inches (12 inches of subsoil and 6 inches of topsoil. For this draft FS it is assumed that under Alternatives 4 and 5, excavation would cease at 12 inches bgs.

- ***Offsite Disposal Assumptions***
  Alternatives 4 assumes offsite disposal of contaminated soils at the Former Libby Vermiculite Mine. This mine is currently being used for disposal of contaminated soils generated during ongoing cleanup activities performed for other operable units within the Libby Asbestos Site.

- ***Hardscape vs. Softscape Assumptions***
  The likely future land use of OU1 is a recreational park for the City of Libby and continued use of the search and rescue building. Since access to the park would be required, portions of OU1 used for vehicular traffic to be are classified as "high intensity traffic use" and would be "hardscaped" to protect the underlying remedy components (soil cover or backfilled areas). Areas that would not have vehicular traffic and would not need the additional protection for the underlying remedy components would be considered "low intensity traffic areas".

  For Alternatives 3 and 4 certain portions/areas of the site would be hardscaped (concrete) or softscaped (sod) after the remedy is put in place depending upon whether the areas have high intensity traffic use (consisting of motorized and non-motorized bikes, trucks and boat trailers, cars, etc.) or low intensity traffic use (consisting of pedestrians) respectively. Furthermore, it is currently assumed (in absence of detailed plans for the future park) that the percentage of surface area of the site dedicated to high intensity traffic use versus low intensity traffic use is 33% to 66%. These percentages will be confirmed and revised, if necessary, in future revisions of the FS.

In addition to the key assumption applied to the Draft FS, there are several ARARs proposed by DEQ that may require additional discussion between EPA and DEQ:

- ***Uncertain Compliance with Standards for Degree of Cleanup Included in National Emissions Standards for Hazardous Air Pollutants (NESHAP) - 40 CFR Part 61 Subpart M***
  NESHAP (40 CFR Part 61 Subpart M), specifically 61.151(a)(2) and (3), sets the standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. It states that the thickness of the soil cover used for containment of asbestos-containing waste material be 2 feet of compacted non-asbestos material and 6 inches of soil supporting vegetation.

  Identification of ARARs in this FS is tentative and has not been fully evaluated by EPA and DEQ. While compliance with this potential ARAR would be relatively straightforward, there may be impacts to other OUs. To be consistent with previous removal/interim remedial activities conducted at the Libby Asbestos Site, it is assumed that the cover thickness would be 18 inches (12 inches of subsoil and 6 inches of topsoil). Excavation backfill depths would be 12 inches (6 inches of subsoil and 6 inches of topsoil).

  All alternatives (except Alternative 1 and 2) presented in this FS would have the same issues of non-compliance with this potential ARAR. If determined to be an ARAR, the FS would be modified to address this ARAR or invocation of one of the ARAR waivers under CERCLA Section 121(d)(4) may be required (potentially the fund-balancing waiver).

- ***Inclusion of groundwater standards: ARM 17.30.1011***
  This section provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality in accordance with 75-5-303, MCA and ARM Title 17, Chapter 30, Subchapter 7.

  Investigation of this media as part of the RI for OU1 has not occurred nor is groundwater considered to be contaminated media in this OU. As the OU1 FS is a surface soil FS there should be limited to no impact on groundwater. CDM suggests that these standards should be designated as "action-specific" ARARs used to monitor implementation of the remedy and not to set cleanup levels for these media at OU1.

- ***The Montana Hazardous Waste Act, §§ 75-10-401 et seq., MCA***
  Rules adopted there under, at ARM Title 17, Chapter 53, establish a regulatory structure for the generation, transportation, treatment, storage and disposal of hazardous wastes.

  Asbestos is not defined as a hazardous waste under RCRA and therefore should not be under the State program as well because mining wastes related to OU1 would be Bevill-exempt. This assumed that wastes from the export plant are still considered mining wastes and the landfill/repository aspects of asbestos are already covered under solid waste and/or asbestos regulations. The inclusion of this ARAR in the OU1 FS could have a potential impact to other OUs.

- ***Mine Reclamation Requirements; Montana Strip and Underground Mine Reclamation Act, §82-4-201 et seq, MCA; Montana Metal Mining Act, § 82-4-301 et seq, MCA***
  Although OU1 is composed of mining wastes (contaminated soil) it is not actually part of the mine proper. Many of the R&A requirements do pertain to OU1. There will be more of an issue as to how this ARAR applies to other OUs.

- ***Montana Floodplain and Floodway Management Act and Regulations, §76-5-401 et seq., MCA; ARM 36.15.601, et seq***
  The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway and floodplain. Libby OU1 is adjacent to the Kootenai River, and these standards are relevant to all actions within the floodplain.

  While OU1 is adjacent to the Kootenai River, according to the 2006 FEMA floodplain maps, OU1 is not within 100-year floodplain.

If you have any questions or concerns, please call me at (720) 264-1121.

Very truly yours,

Dee Warren

Dee Warren
CDM Federal Programs Corporation

cc: Amishi Castelli, Volpe Center

Draft
Feasibility Study Report
Operable Unit 1 - Former Export Plant Site
Libby Asbestos Superfund Site
Libby, Montana

May 23, 2008

Contract No. DTRT57-05-D-30109
Task Order No. 00006

Prepared for:

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Section 4 Identification and Screening of General Response Actions, Remedial Technologies, and Process Options

Section 5 Development and Screening of Alternatives

Section 6 Definition of Criteria Used in the Detailed Analysis of Retained Alternatives

Section 7 Detailed Analysis of Retained Alternatives

Section 8 References

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Acronyms

ABS	activity-based sampling
ACM	asbestos containing material
ARARs	applicable or relevant and appropriate requirements
ARI	ARI Technologies Inc.
ARM	Administrative Rules of Montana
BNSF	Burlington Northern and Santa Fe Railroad
BLRA	baseline human health risk assessment
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DEQ	Montana Department of Environmental Quality
EPA	U. S. Environmental Protection Agency
FRTR	Federal Remediation Technologies Roundtable
FS	feasibility study
GCL	geosynthetic clay liner
GRA	general response action
Grace	W.R. Grace Company
KDC	Kootenai Development Corporation
LA	Libby amphibole asbestos
MCA	Montana Code Annotated
Millwork West	Millwork West Company
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	non-detect
NESHAP	National Emissions Standards for Hazardous Air Pollutants
O&M	operations and maintenance
OU	Operable Unit
PLM	polarized light microscopy
PRAOs	preliminary remedial action objective
PRGs	preliminary remediation goal
RI	remedial investigation
ROD	record of decision
site	Export Plant Site
SLERA	screening level ecological risk assessment
TCCT	thermo-chemical conversion technology
USC	United States Code
USGS	U. S. Geological Survey
XRD	X-ray diffraction

%	percent
°F	degrees Fahrenheit
bgs	below ground surface
cfs	cubic feet per second
cy	cubic yards
ft	feet
ft^2	square feet
gpd/ft	gallons per day per foot
S/cc	structures per cubic centimeter
S/cm^2	structures per square centimeter

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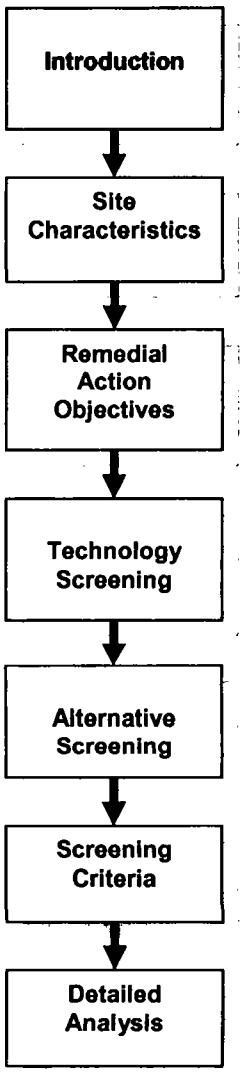
Section 1
Introduction

1.1 Purpose and Organization

This feasibility study (FS) report for the former Export Plant Site (site), Operable Unit 1 (OU1) of the Libby Asbestos Site was prepared for the U. S. Environmental Protection Agency (EPA) Region 8 by CDM Federal Programs Corporation (CDM) under Contract No. DTRT57-05-D-30109, Task Order No. 00006 with the John A. Volpe Center National Transportation Systems (Volpe Center).

The work performed during the FS was in accordance with guidance developed by EPA for conducting an FS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (EPA 1988). In addition, the cost estimates for each alternative were developed in accordance with *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a).



This report presents the results of the development, screening, and detailed evaluation of remedial alternatives to address media contaminated with Libby amphibole asbestos (LA) for the site in Libby, Montana. This report is organized as follows:

- Section 1 discusses the purpose of the FS report, the report organization, and site background information (site location, site description, operational history, previous investigations, and environmental setting).
- Section 2 describes the characteristics of the site, including the conceptual site model (CSM), site features and physical characteristics, a summary of the nature and extent of contamination resulting from past activities at the site, and a summary of human health risks posed by site contamination.
- Section 3 describes the process for identifying preliminary remedial action objectives (PRAOs) based on the results of the baseline human health risk assessments (BLRA). This section also identifies potential applicable or relevant and appropriate requirements (ARARs) for the site.
- Section 4 describes the options for general response actions (GRAs) and the screening and evaluation of different remedial technologies and process options.

- Section 5 describes the remedial alternatives and the screening process followed to reduce the remedial alternatives to those considered to be most suitable for possible implementation.
- Section 6 describes the criteria used to evaluate the alternatives retained during the screening process completed in Section 5.
- Section 7 presents a detailed analysis of the remedial alternatives and summarizes the comparative analysis conducted to compare and contrast the remedial alternatives.
- Section 8 lists the references and documents referred to in this FS.
- Appendix A provides the Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) Compliance.
- Appendix B provides quantity calculations for the alternatives.
- Appendix C documents the screening of alternatives.
- Appendix D documents the alternative screening cost information. Screening costs are +100%/-50%.
- Appendix E provides the inspection and monitoring schedule.
- Appendix F provides the detailed analysis of alternatives.
- Appendix G provides the detailed alternative analysis cost information. Detailed analysis costs are +50%/-30%.

1.2 Site Location and Description

To facilitate a multi-phase approach to remediation of the Libby Asbestos Site, seven separate OUs have been established. These OUs are shown on Figure 1-1.

The seven established OUs to facilitate a multi-phase approach to remediation of the Libby Asbestos Site includes (refer Figure 1-1):

- OU1. The former Export Plant is defined geographically by the property boundary of the parcel of land that included the former Export Plant.
- OU2. The exact geographic area of OU2 has not yet been defined, but includes areas impacted by contamination released from the former Screening Plant. These areas include the former Screening Plant, the Flyway property, the Highway 37 right-of-way adjacent to the former Screening Plant and/or Rainy Creek Road, the Wise property, and the Kootenai Development Corporation (KDC) Bluffs. The KDC Bluffs area is located directly across the Kootenai River from the former Screening Plant.

- OU3. The mine OU includes the former vermiculite mine and the geographic area (including ponds) surrounding the former vermiculite mine that has been impacted by releases from the mine, including Rainy Creek and the Kootenai River. Rainy Creek Road is also included in OU3. The exact geographic area of OU3 has not yet been defined but will be based primarily upon the extent of contamination associated with releases from the former vermiculite mine.

- OU4. OU4 is defined as residential, commercial, industrial (not associated with former W.R. Grace operations), and public properties, including schools and parks in and around the City of Libby, or those which have received material from the mine not associated with W.R. Grace operations. Highway transportation corridors such as Highway 37 (including the five miles of Highway 37 beginning at the intersection of Rainy Creek Road and extending into the town of Libby) are also included in OU4. Portions of Highway 37 associated with the Screening Plant are addressed in OU2 and are therefore excluded from OU4.

- OU5. The former Stimson Lumber Mill is defined geographically by the parcel of land that included the former Stimson Mill.

- OU6. The rail yard owned and operated by the Burlington Northern and Santa Fe Railroad (BNSF) is defined geographically by the BNSF property boundaries and extent of contamination associated with the rail yard. Railroad transportation corridors are also included in this OU and have not been geographically defined.

- OU7. The Troy OU includes all residential, commercial, and public properties within the town of Troy, Montana, approximately 20 miles west from downtown Libby.

OU1, the focus of this FS, is situated on the south side of the Kootenai River, just north of the downtown area of the City of Libby, Montana (Figure 1-2). The property is bounded by the Kootenai River on the north, Montana Highway 37 (forthwith referred to as Highway 37) on the east, the BNSF railroad thoroughfare on the south, and State of Montana property on the west.

Based on current land use, the site is divided into two distinct areas separated by City Service Road: the area of the site to the south of City Service Road (approximately 12 acres) and a 4.7-acre recreational area known as Riverside Park to the north of City Service Road. For discussion purposes, these areas will be referred to throughout this report as Area 1 and Area 2, respectively. Figure 1-3 shows the delineation between the two areas. In addition, the shoulders of Highway 37 on the southwest side of the Highway 37 bridge has been included in the remedial investigation (RI) report (CDM 2008) as an area of concern because of their immediate proximity to the site and the known presence of vermiculite in this area. Decisions regarding this area were not made in conjunction with the details and risk assessment provided in the RI report; however relevant results of the Highway 37 embankment sampling have been discussed in the RI but are not part of this FS.

The vermiculite deposit near Libby is contaminated with a distinct form of naturally-occurring amphibole asbestos that is comprised of a range of mineral types and morphologies. In various past reports, this form of amphibole asbestos has been termed interchangeably by EPA as Libby Amphibole or Libby Asbestos. For additional information pertaining to the definition of LA, refer to Section 1 of the RI report (CDM 2008).

1.3 Site Background and History

Numerous hard rock mines have operated in the Libby area since the 1880s, but the dominant impact to human health and the environment in Libby has been from vermiculite mining and processing. Prospectors first located vermiculite deposits in the early 1900s on Rainy Creek northeast of Libby. Edward Alley, a local rancher, was also a prospector and explored the old gold mining tunnels and digs in the area. Reportedly, while exploring tunnels in the area, he stuck his miner's candle into the wall to chip away some ore samples. When he retrieved his candle, he noticed that the vermiculite around the candle had expanded, or "popped," and turned golden in color.

In 1919, Alley bought the Rainy Creek claims and started the vermiculite mining operation called the "Zonolite Company." While others thought the material was useless, he experimented with it and discovered it had good insulating qualities. Over time, vermiculite became a product used in insulation, feed additives, fertilizer/soil amendments, construction materials, absorbents, and packing materials. Many people used vermiculite products for insulation in their houses in Libby and soil additives in their gardens. In 1963, the W. R. Grace Company (Grace) bought the mine and associated processing facilities and operated them until 1990.

Operations at the mine included blast and drag-line mining and milling of the ore. Dry milling was done through 1985, and wet milling was done from 1985 until closure in 1990. After milling, concentrated ore was transported down Rainy Creek Road by truck to a screening facility (known today as the former Screening Plant) adjacent to Highway 37, at the confluence of Rainy Creek and the Kootenai River. Here the ore was size-sorted and transported by rail or truck to processing facilities in Libby and nationwide. At the processing plants, the ore was expanded or "exfoliated" by rapid heating, then exported to market via truck or rail. Historic maps show the location of the "Zonolite Company" processing operation at the edge of the lumber mill, near present day Libby City Hall. This older processing plant was taken off line and demolished sometime in the early 1950s. The other processing plant (known today as the former Export Plant), was located near downtown Libby near the Kootenai River and Highway 37. Expansion operations at site, ceased sometime prior to 1981, although existing site buildings were still used to bag and export milled ore until 1990.

After operations ceased, Grace completed reclamation of the vermiculite mine. Reclamation included demolition of existing facilities and standard land recontouring and revegetation. The former Screening Plant was sold and converted into a nursery

and was used for that purpose until 2000. OU1 was converted into a lumber business and was used for that purpose until 2001.

Over the course of Grace's operation in Libby, invoices indicate shipment of nearly 10 billion pounds of vermiculite from Libby to processing centers and other locations. Most of this was shipped and used within the United States. Nearly all of this material ended up in a variety of commercial products that were marketed and sold to millions of consumers.

1.3.1 Historic Use

From the early 1960s to approximately 1992, the site was used by Grace for stockpiling and distributing vermiculite concentrate to Grace expansion plants and customers throughout the United States. Ownership of the site was transferred to the City of Libby in the mid-1990s.

Throughout its history, portions of the site have been leased to various parties for both commercial and non-commercial enterprises. From approximately 1977 to 1997, organized youth baseball events (games and practices) were held at ball fields, which were centrally located in Area 1. Between approximately 1987 and 2000, the Millwork West Company (Millwork West), a retail lumberyard and building material supplier, leased the northwestern portion of Area 1. Buildings and equipment owned by Millwork West were involved in cleanup activities conducted by Grace in 2001 and 2002.

1.3.2 Current Use

Area 1 is currently owned by the City of Libby and is undeveloped, with the exception of small area of the site currently used by David Thompson Search and Rescue. In 2004, the search and rescue organization constructed a building (see Figure 1-3) containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road (also known as West Thomas Street). The organization performs various types of search and rescue activities involving but not limited to water- and mountain-related incidents. The garage is used for storing search and rescue equipment and vehicles. Several other agencies, including local and state law enforcement, also hold meetings in the main office. It has been reported that the city stockpiles street sweepings and snow at Area 1 as part of regular city maintenance activities. Access to Area 1 is unrestricted.

Area 2, Riverside Park, is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, a pavilion, picnic tables, and a pumphouse. The newer of the two boat ramps is used by recreational boaters and commercial fishing outfitters; the older ramp is not commonly used due to swift current at its approach. The pumphouse (see Figure 1-3) houses a pump that draws non-potable water from the Kootenai River. The pump was installed jointly by the City of Libby and Lincoln County in 1999 to provide a backup water source to local fire departments. The pumphouse is accessed by city personnel in order to perform maintenance on the pump. The pump is connected to

an external water spigot, which is used by the city to draw water for street sweeping and other maintenance operations, and other workers (such as employees of local fill pits and contractors working on EPA's removal program) to draw water primarily for use in dust suppression equipment.

1.3.3 Future Use

Development of Area 1 into an industrial or recreational park is currently under consideration by the city's planning department; however, permanent future plans are unknown at this time. The city expects that David Thompson Search and Rescue will continue to utilize the northwest portion of the site. Area 2 will continue to serve recreational visitors; a change in land use is not currently anticipated per personal correspondence with Dan Theade 2007.

1.4 Previous Remedial Actions

Interim remedial actions, such as the removal of vermiculite contaminated dust, soil, and debris, were performed at the site in conjunction with site investigation activities and emergency response actions. These interim actions were taken to reduce volumes of LA and to reduce further exposure to source material. From 2000 until 2003, several removal activities were completed within the two areas of OU1 and are summarized below. Exhibit 1-3 was generated from site background and historic information from the RI report. For additional information pertaining to the following remedial actions, refer to Section 2 of the RI report (CDM 2008).

Exhibit 1-1. Summary of Previous Remedial Actions

Year	Material Removed	Summary of Remedial Actions
Area 1 – Former Export Plant		
2000 July – 2001 January	Vermiculite contaminated dust, soil, and debris	Interior cleaning of five onsite historic buildings and the buildings content, excavation and disposal of vermiculite contaminated soil and debris.
2001, September/ October	Building demolition materials and vermiculite contaminated soil	Demolition of four of the five historic buildings and excavation and disposal of additional contaminated soil
2002, October – December	Building demolition materials and vermiculite contaminated soil	Demolition of the remaining one historic building (planar shop) and excavation and disposal of additional contaminated soil from the footprint of the demolished planar shop and from an area near the BNSF railroad tracks
Area 2 – Riverside Park		
2003, October/ November	Vermiculite contaminated soil	Excavation and disposal of vermiculite contaminated soil

1.5 Summary of Study Area Investigations

The following site investigations were performed from 1999 through 2007 to determine the nature and extent of LA contaminated media. Sampling activities included soil sampling, dust sampling, air sampling, bulk materials sampling, and

activity-based sampling (ABS) at OU1. As described in Section 1.2, this OU has been divided into two areas: Area 1 the former Export Plant, and Area 2 - Riverside Park. The exhibit summarizes previous site investigations as documented in the RI report. For additional information pertaining to the following site investigations, refer to Section 2 of the RI report (CDM 2008).

Exhibit 1-2. Summary of Previous Site Investigations by Area and Year

Year	Type of Investigation	Summary of Site Investigations
Area 1 – Former Export Plant		
1999, December	Soil sampling	Baseline evaluation of LA soil contamination on-site.
2000, March/ April	Soil and stationary air sampling	Soil sample event to supplement the 1999 investigation and better characterize site soils. In addition stationary outdoor air sampling was conducted in order to establish baseline concentrations of LA in ambient air at the site.
2000, June	Scenario-based personal air sampling	EPA conducted scenario-based personal air sampling to assess the exposure risk associated with the physical disturbance of LA in areas that contain Libby vermiculite. Investigated routine activities included floor sweeping and moving bags of vermiculite insulation inside of a building.
2001, March/ April/ August	Soil, bulk materials, and dust sampling	Investigation soil, bulk materials (wood shavings, insulation, debris, etc. from within the five buildings), and dust (horizontal surfaces inside the warehouse and the pole barn) sampling activities to determine if residual levels of LA remained at the site after the 2000/2001 removal.
2002, April/ May	Bulk materials and soil sampling	In response to concerns of site tenants regarding potential residual contamination bulk materials samples (from the interior of equipment owned and operated by Millwork West) and soil samples (from areas at the site where suspect mine-related material had been identified) were collected.
2006, June - September	City of Libby water line installation	During the excavation of a trench through the field portion of Area 1 parallel to City Service Road in preparation for installing a new drinking water supply pipeline, gross quantities of vermiculite were encountered. Soil samples were collected from the soil stockpiled during the initial pipeline excavation.
2007, September - October	RI data gap sampling	This site-wide sampling event included soil sampling and indoor ABS. Surface soil samples had been collected at the site and a nearby portion of Highway 37 to evaluate LA asbestos content and presence/absence of surficial vermiculite using a grid pattern. In addition, ABS was conducted to assess indoor air in the onsite building and outdoor air near disturbed soils by collecting soil samples.

Exhibit 1-2. Summary of Previous Site Investigations by Area and Year (continued)

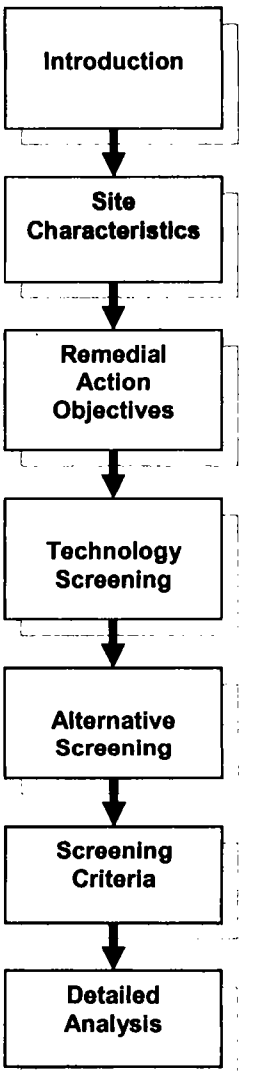
Year	Type of Investigation	Summary of Site Investigations
Area 2 – Riverside Park		
2003, May/July	Investigation soil sampling	During construction of a new boat ramp vermiculite was discovered along the west side of the ramp in addition vermiculite-containing soil was exposed during renovation of the picnic area. In response to the discovery of the contaminated material at the site, a visual inspection and soil sampling was conducted.
2003, September/ October	Pre-removal characterization	Pre-removal characterization included a verbal interview with city park personnel, visual inspection of the site, and collection of both surface and subsurface soil samples.
2007, September	RI data gap sampling	Surface soil samples had been collected at the site using a grid pattern to evaluate LA asbestos content and presence/absence of surficial vermiculite.

Results from the site investigations are discussed in Section 2.4.

Section 2
Site Characteristics

As of May 2008, the screening level ecological risk assessment (SLERA) and BLRA are currently under development; it is expected that the BLRA will show that LA contributes to human health risks at the site. This section summarizes topics discussed in the RI (CSM, site features, physical characteristics, and nature and extent of contamination). This section also provides information on the importance of remediating or managing LA at the site.

For complete details of the site characteristics and the nature and extent of contamination, please refer to the RI report (CDM 2008).



2.1 Conceptual Site Model

The CSM incorporates the primary mechanisms that lead to release of contaminants from source materials, migration routes of contaminants in the environment, exposure pathways, and human/ecological receptors. As mentioned previously, LA is the dominant environmental concern at the site. The CSM for current and future receptors at OU1 is presented in Figure 2-1.

2.1.1 Sources of Vermiculite

Vermiculite and/or vermiculite concentrate was transported to OU1 from the mine for stockpiling and staging prior to distribution. It is also believed that vermiculite materials were used to fill in low lying areas of the site. The potential contaminated media of concern for OU1 include: indoor air, dust in air of vehicles, outdoor air near disturbed soil, general (ambient) outdoor air, and dust in air from disturbances of roofing or other outdoor surfaces.

2.1.2 Migration Routes and Exposure Pathways

Current potential human receptors at the site include civil servants/commercial workers, tradespeople, and recreational visitors. The current civil servants are those persons who are part of the David Thompson Search and Rescue team. This team's support building is within the boundary of OU1 and is used to store equipment between responses. Recreational users include persons who use the boat ramp area to launch boats into the Kootenai River, persons who fish along the banks of the Kootenai River along the stretch of river that forms the northern boundary of the site, and persons who use Riverside Park.

The exposure route of chief concern for asbestos is by inhalation of asbestos fibers in air. Human populations at the site may be exposed to asbestos in air by four main pathways:

- Inhalation of fibers released during active soil disturbance activities
- Inhalation of fibers in indoor air
- Inhalation of fibers in outdoor (ambient) air

Of these pathways, inhalation exposure resulting from active soil disturbance is believed to be the most likely to be significant. Section 2.6 provides a summary of human exposure and risk estimates that have been derived to date.

2.2 General Site Features

2.2.1 Site Features

Area 1 is currently owned by the City of Libby and is undeveloped. In 2004, the David Thompson Search and Rescue organization constructed a building containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road (also known as West Thomas Street) (CDM 2007a).

Area 2 is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, a pavilion, picnic tables, and a pumphouse (CDM 2007a).

City Service Road is a partially paved access road for several residential and commercial properties west of the site.

2.3 Summary of Physical Characteristics

2.3.1 Climate

Libby has a relatively moist climate, with annual precipitation in the valley averaging slightly over 20 inches (this includes approximately 60 inches of snowfall). Surrounding higher elevations receive significantly more precipitation. During the winter months, moist Pacific air masses generally dominate, serving to moderate temperatures and bring abundant humidity, rain, and snow. Colder, continental air masses occasionally drop temperatures significantly, but generally only for shorter periods. The average temperatures in December and January are 25 to 30 degrees Fahrenheit (°F).

During summer, the climate is warmer and dryer, with only occasional rain showers and significantly lower humidity and soil moistures. High temperatures of greater than 90 °F are common. The average temperature in July is approximately 65 to 70 °F. Spring and fall are transition periods.

Due to its valley location along the Kootenai River and downstream of the Libby dam, fog is common in the Libby valley. This effect is most pronounced during winter and in the mornings. Inversions, which trap stagnant air in the valley, are also common. Winds in the Libby valley are generally light, averaging approximately 6 to 7 miles per hour. Prevailing winds are from the WNW, but daily wind direction is significantly affected by temperature differences brought about by the large amount of vertical relief surrounding the area.

2.3.2 Geology

The mountains surrounding Libby are generally composed of folded, faulted, and metamorphosed blocks of Precambrian sedimentary rocks and minor basaltic intrusions. Primary rock types are meta-sedimentary argillites, quartzites, and marbles (Ferreira et al. 1992).

Excluding vermiculite-related materials that may be present, X-ray diffraction (XRD) analyses by the U.S. Geologic Survey (USGS) of shallow, sub-surface soils from more than ten sites in the Libby area show that they are comprised of major (>20 percent) quartz, minor (5-20 percent) muscovite (and/or illite) and albitic feldspar, trace (<5 percent) orthoclase, clinoclore, non-fibrous amphibole (likely magnesiohornblende), calcite, amorphous material (probably organic) and possible pyrite and hematite. Other minerals will be present at levels below 0.5 percent and are generally not detectable by routine XRD analysis. These mineral components represent the average components for the area and will vary to some extent depending on location and history. Surface soils contain the above components with the addition of more organic material (USGS 2002).

The vermiculite deposit located at Vermiculite Mountain, the source of LA, is located approximately 7 miles northwest of the town of Libby in the Rainy Creek drainage. The vermiculite deposit specific to the Libby Mine is classified as a deposit within a large ultramafic intrusion, such as pyroxenite plutons, which is zoned and cut by syenite or alkalic granite and by carbonatitic rock and pegmatite. The formation of vermiculite and asbestiform amphiboles in the Libby mine deposit, have been assessed to be the result of the alteration of augite by high-temperature silica-rich solutions (USGS 2002).

The Vermiculite Mountain deposit is contained within the Rainy Creek alkaline-ultramafic complex. The Rainy Creek complex is described as the upper portion of a hydrothermally altered alkalic igneous complex composed primarily of magnetite pyroxenite, biotite, pyroxenite, and biotititie. the upper portion of a The original ultramafic body is an intrusion into the Precambrian Belt Series of northwestern Montana with a syenite body southwest of the adjacent to the altered pyroxenite and is associated with numerous syenite dikes that cut the pyroxenites.

2.3.3 Surface Water

The Kootenai River, which flows adjacent to the site, has its origins in British Columbia's Kootenay National Park in Canada. From there it flows 485 miles into northwest Montana and through the towns of Libby and Troy. From there it flows into northern Idaho, then back into Canada and Kootenay Lake. Ultimately it joins with the Columbia River. Sixteen miles north of Libby, the river is held back by Libby Dam, creating a 90-mile long reservoir called Lake Koocanusa which reaches into Canada (LibbyMT.com. 2007).

Several creeks provide drainage from the Cabinet Mountains Wilderness south of Libby to the Kootenai River. Some of these creeks include Flower Creek, Granite Creek, and Libby Creek.

As stated in Section 3.1.2 in the RI report, Libby has a relatively moist climate with annual valley precipitation slightly over 20 inches. Higher elevations receive significantly more precipitation and account for much of the creek flow. Seasonal fluctuations cause varying levels of runoff and creek flow. Typically, runoff is most significant in spring when snow at higher elevations begins to melt. Summer precipitation does occur; however, typical summer weather is hot and dry and creek flow is moderated by high elevation lakes.

2.3.4 Groundwater

The Libby basin is hydrologically bound to the west by the pre-Cambrian bedrock, to the north by the Kootenai River and to the east by Libby Creek. The southern boundary of the basin extends under the high terrace of glacial lake bed sediments and with the alluvium of Libby Creek (Woodward-Clyde Consultants 1988).

The sediments overlying bedrock in the vicinity of the town of Libby are of glacial, glaciofluvial or alluvial origins. The site stratigraphy is characterized by lenses of interbedded units consisting of gravels, sands, and silty to clayey gravels and sands. These units are the result of numerous episodes of alluvial and glacial erosion and deposition. Types of depositional environments likely to have existed in the Libby area include braided stream, overbank, splay, point bar, till, moraine, outwash, loess (Aeolian), channel, and lucustrine. These environments moved in time and space, occurred contemporaneously, cancelled each other out (by erosion) and varied drastically in the level of energy and capacity to sort the available clastic material (Woodward-Clyde Consultants 1988).

Although water bearing sediments are present to a depth of at least 250 feet (ft) below ground surface (bgs), the most prolific and most commonly utilized zones are found between depths of 20 to 70 ft. This zone is referred to as the upper aquifer zone or the shallow aquifer. This upper zone is not characteristic of the classic "layer cake" stratigraphy, having a consistent top or bottom, but appears to exhibit similar aquifer properties (high transmissivity of the order of 200,000 gallons per day per foot [gpd/ft]) and is fairly significant in lateral extent and continuity. Many low permeability or non-water producing zones are encountered within the first 70 ft but

these are thought to be lenticular and of limited areal extent (point bars, braided stream islands, etc.). Results from shallow aquifer tests conducted from the Phase IV hydrogeologic investigation suggested that the shallow aquifer is semi-confined and that hydraulic conductivity is anistrophic (i.e., groundwater flow conditions vary with direction) (Woodward-Clyde Consultants 1988).

Low permeability material underlies this upper aquifer. The lower aquifer zone or deep aquifer system ranges in depth from approximately 100 to 160 ft bgs. The local effectiveness of this unit is demonstrated by a separation in water levels by as much as 20 ft; however, the water levels were reported to converge and imply little overall hydraulic separation exists between the two aquifer zones (Woodward-Clyde Consultants 1988).

Below 150 ft to bedrock, the glacial deposits have shown little capacity to transmit water. Bedrock beneath the town of Libby may lie at depths greater than 500 ft and consists of pre-Cambrian meta-sediments (Woodward-Clyde Consultants 1988).

In general, groundwater flow in the Libby area is dominated by steep valley flow from the southern Cabinet Mountain wilderness, and is then influenced to the northwest by the Kootenai River alluvial plain which serves as a point of regional and local groundwater discharge (Woodward-Clyde Consultants 1988).

2.3.5 Demography and Land Use

Currently, the portion of land south of City Service Road is owned by the City of Libby and is undeveloped; however, a small section of the site is currently used by David Thompson Search and Rescue. In 2004, the search and rescue organization constructed a building containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road (also known as West Thomas Street). The organization performs various types of search and rescue activities involving but not limited to water- and mountain-related incidents. The garage is used for storing search and rescue equipment and vehicles. Several other agencies, including local and state law enforcement, also hold meetings in the main office. It has been reported that the city stockpiles street sweepings and snow in this area as part of regular city maintenance activities. Access to this area is unrestricted (CDM 2007a).

The portion of land north of City Service Road is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, a pavilion, picnic tables, and a pumphouse. The newer of the two boat ramps is used by recreational boaters and commercial fishing outfitters; the older ramp is not commonly used due to swift current at its approach. The pumphouse (see Figure 1-3) houses a pump that draws non-potable water from the Kootenai River. The pump was installed jointly by the City of Libby and Lincoln County in 1999 to provide a backup water source to local fire departments. The pumphouse is accessed by city personnel in order to perform maintenance on the pump. The pump is connected to an external water spigot, which is used by the city to draw water for

street sweeping and other maintenance operations, and other workers (such as employees of local fill pits and contractors working on EPA's removal program) to draw water primarily for use in dust suppression equipment (CDM 2007a).

Development of the area south of City Service Road into an industrial or recreational park is currently under consideration by the city's planning department; however, permanent future plans are unknown at this time. The city expects that David Thompson Search and Rescue will continue to utilize the northwest portion of the site. The area north of City Service Road will continue to serve recreational visitors; a change in land use is not currently anticipated (CDM 2007a).

Based on the most recent population estimates available, approximately 2,600 people reside within the city limits of Libby, and approximately 11,000 people reside in the general area of Libby (zip code 59923), which includes the populated areas outside the city limits.

2.4 Summary of Nature and Extent of Contamination

This section discusses the nature and extent of contamination of LA at the site.

LA has been observed in all the media sampled at the site: indoor air, indoor dust, outdoor ambient air, outdoor air near disturbed soils, and soil (surface and subsurface). The following table summarizes the observations of total LA concentrations for each media evaluated for OU1 that are most relevant to the current status of the site (for additional information refer to the RI report [CDM 2008]):

Exhibit 2-1. Summary of LA Results Per Media Representing the Current Status of OU1

Media	Total Number of Samples Collected	Total Number of Samples with LA	Percentage of Samples with LA Observed (%)	Range of LA Results
Indoor Air	22	18	82	ND to 0.0699 S/cc
Indoor Dust	9	2	22	ND to 75 S/cm^2
Outdoor Ambient Air	157	14	9	ND to 0.0002 S/cc
Outdoor Air Near Disturbed Soils	8	6	75	ND to 0.0715 S/cc
Surface Soil	48	13	27	ND to Trace

Notes: LA – Libby amphibole asbestos; OU1 – operable unit 1; % - percent; ND – non-detect; S/cc – structures per cubic centimeter; S/cm^2 – structures per square centimeter

Key findings from OU1 sampling, as related to the present condition of the site, include the following:

- LA has been observed in indoor air and indoor dust samples at the search and rescue support building
- Observations of LA in indoor air at the site indicate LA is encountered during both active and passive activities within the garage and meeting room areas of the search and rescue building
- LA has been observed in outdoor ambient air samples collected near OU1
- LA has been observed in personal air samples collected during brush hogging activities within the boundary of OU1
- Current surface soils within the OU1 boundary contain LA at ND or trace levels (Figures 2-2 and 2-3)
- Current surface soils within the OU1 boundary contain visible vermiculite (Figures 2-2 and 2-3)

2.5 Summary of Sampling and Analysis Methods

Various sampling and analysis methods may be used to determine the presence of asbestos fiber in different media, such as soil, dust, and air. The following list provides examples of these types of methods that have been implemented as part of the remedial activity and risk assessment evaluation at the site:

- Activity-based sampling (ABS) - ABS simulates routine activates that would be conducted by users of the site to estimate potential exposures. Personal air samples are collected from contractors engaged in an activity and the sample analyzed for asbestos fibers using TEM analysis.
- Ambient air sampling - Ambient air sampling is completed by establishing stationary air monitoring stations within the vicinity or downwind of contaminated areas and collecting continuous air samples using a pump and air filtering cassette. The purpose of ambient air sampling is to determine the extent of friable asbestos fiber release from the soil. Weather data is also collected to correlate climatic condition with measured releases of asbestos fibers. Samples are analyzed for asbestos fibers using transmission electron microscopy (TEM) analysis.
- Personal Air Monitoring - Personal air samples will be collected from the breathing zones of the event participants during various activities (intrusive and/or non-intrusive) in accordance with EPA-LIBBY-01, provided in Appendix A. Personal air samples will be collected at two flow rates using two different types of pumps during each two-hour event, with a new sample started at the beginning of each new period. The flow rates for sample collection should be 10 and 3.5 L/min

resulting in target volumes of 1,200 and 420 L, respectively. Both the high volume and low volume samples will be submitted to the laboratory for analysis using TEM.

- Polarized light microscopy (PLM) with stereomicroscopy analysis - Soil samples will be analyzed using EPA/600/R-93/116 with a modified protocol that will use a combination of PLM and stereomicroscopy y analysis to identify bulk asbestos containing material (ACM) and/or asbestos fibers that may be present in soils.

- Visual inspection - A visual inspection of ACM is completed by first designating inspection areas to establish a boundary around the inspection zone. The soil is then visually inspected for ACM material using an intrusive or non-intrusive method, described as follows:

  - Non-Intrusive Visual Inspection: A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of ACM debris.

  - Intrusive Visual Inspection: An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of ACM debris.

A decision to implement any of these types of methods has not been determined at this time.

2.6 Summary of Baseline Risk Assessments

Pursuant to federal regulations (National Oil and Hazardous Substances Pollution Contingency Plan [NCP] Part 300.430(d)(2)), EPA is required to:

> "...characterize the nature of and threat posed by the hazardous substances and hazardous materials and gather data necessary to assess the extent to which the release poses a threat to human health or the environment..."

This section will summarize the initial findings of the BLRA once it is available.

2.6.1 Baseline Human Health Risk Assessment

2.6.1.1 Scope of the Assessment

This section will be drafted once the OU1 risk assessment is available.

2.6.1.2 Exposure and Risk from Asbestos

This section will be drafted once the OU1 risk assessment is available.

2.6.2 Screening-Level Ecological Risk Assessment

Ecological receptors and environmental impacts will be characterized as part of OU4, which includes residential and commercial properties within the Libby Site.

2.7 Summary of Site Characteristics

Based on the information currently available and presented in this summary of the RI report, the following key findings from OU1 sampling, as related to the present condition of the site, include the following:

- LA has been observed in indoor air and indoor dust samples at the search and rescue support building
- Observations of LA in indoor air at the site indicate LA is encountered during both active and passive activities within the garage and meeting room areas of the search and rescue building
- LA has been observed in outdoor ambient air samples collected near OU1
- LA has been observed in personal air samples collected during brush hogging activities within the boundary of OU1
- Current surface soils within the OU1 boundary contain LA at ND or trace levels (Figure 4-1)
- Current surface soils within the OU1 boundary contain visible vermiculite (Figure 4-1)
- Surface soils in the Highway 37 embankment areas adjacent to OU1 contain visible vermiculite and LA at levels as high as 1% (Figure 4-1)

In the following sections, the FS will evaluate potential remedial alternatives to address risks to human health and the environment posed by contamination at the site.

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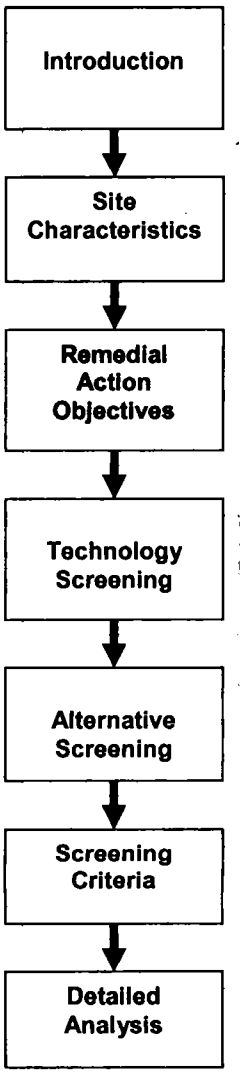
Section 3
Remedial Action Objectives

Section 300.430(e) of the NCP requires the remedial alternative development process be initiated by developing PRAOs, identifying general response actions that address these PRAOs, and performing an initial screening of applicable remedial technologies. The goal of the remedy selection process is "to select remedies that are protective of human health and the environment, maintain protection over time, and minimize untreated waste." PRAOs are media-specific and source-specific goals to be achieved through completion of an RA that is protective of human health and the environment. These objectives are typically expressed in terms of the contaminant, the concentration of the contaminant, and the exposure route and receptor.



PRAOs are typically developed by evaluating several sources of information, including results of the BLRA and BERA and tentatively identified ARARs. These inputs provide the basis for determination of whether protection of human health and the environment is achieved for a remedial alternative.

The following sections present the ARARs, the preliminary remediation goals (PRGs), and PRAOs that have been identified for the site.

3.1 Applicable or Relevant and Appropriate Requirements

EPA and DEQ have conducted initial discussion concerning potential federal and state ARARs and have tentatively identified regulations that may be applicable or relevant and appropriate to the site. Appendix A constitutes the initial identification and detailed description of ARARs for the implementation of a remedial action at the site. Final ARARs will be set forth in the record of decision (ROD) as performance standards for any and all remedial design and subsequent remedial actions.

Implementation of an onsite portions of a remedial action for the site would not require Federal, State, or local permits in accordance with Section 121(e) of CERCLA. The onsite portions of a remedial action include not only the contaminated area within the site boundary, but also all areas in very close proximity to the contamination necessary for implementation of the remedial action. However, the response must comply with all substantive requirements that are "applicable" or "relevant and appropriate." Offsite actions like hauling, disposal and borrow source development would only require compliance with applicable requirements, but compliance with both substantive and administrative components of the applicable

regulations are necessary. Exhibit 3-1 contains a summary of the scope and intent of ARARs with regards to onsite and offsite actions.

Exhibit 3-1. Scope and Extent of ARARs

	Scope of Requirements	Extent to Which Other Laws Apply
Onsite Compliance	Substantive	Applicable or Relevant and Appropriate
Offsite Compliance	Substantive and Administrative	Applicable Requirements

3.1.1 Definition of ARARs

Section 121(d) of CERCLA, 42 United States Code (U.S.C.) § 9621(d), the NCP, 40 Code of Federal Regulations (CFR) Part 300 (1990), and guidance and policy issued by EPA require that remedial actions under CERCLA comply with substantive provisions of ARARs from state and federal environmental laws, and state facility siting laws during and at the completion of the remedial action. ARARs are designated as either "applicable" or "relevant and appropriate," according to EPA guidance. If a state or federal environmental law is determined to be either applicable or relevant and appropriate, compliance with the substantive requirements of that ARAR are mandatory under CERCLA and the NCP. Compliance with ARARs is a threshold criteria that any selected remedy must meet unless a legal waiver as provided by CERCLA Section 121(d)(4) is invoked.

3.1.1.1 Applicable Requirements

Applicable requirements specifically refer to cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental laws or state environmental and facility siting laws. These requirements address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

3.1.1.2 Relevant and Appropriate Requirements

Relevant and appropriate requirements specifically refer to cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental laws or state environmental or facility siting laws. These requirements are not directly applicable to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site but address problems or situations sufficiently similar (relevant) to those encountered at the CERCLA site such that their use is well suited to the particular site.

The determination that a requirement is relevant and appropriate is a two-step process that includes (1) the determination if a requirement is relevant and (2) the determination if a requirement is appropriate. In general, this involves a comparison of a number of site-specific factors, including an examination of the purpose of the requirement and the purpose of the proposed CERCLA action, the medium and substances regulated by the requirement and the proposed remedial action, the

actions or activities regulated by the requirement and the remedial action, and the potential use of resources addressed in the requirement and the remedial action. When the analysis results in a determination that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (EPA 1988).

3.1.1.3 To Be Considered

When ARARs are not fully protective, other federal or state policies, guidelines, or proposed rules capable of reducing the risks posed by a site can be implemented. These policies, guidance, guidelines, proposed rules or other sources of information are "to be considered" in the selection of the remedy and implementation of the ROD. Although not enforceable requirements, these documents are important sources of information that EPA and the state may consider during selection of the remedy, especially in regard to the evaluation of public health and environmental risks, or which will be referred to, as appropriate, in selecting and developing cleanup actions [40 CFR § 300.400(g)(3), 40 CFR § 300.415(I)].

3.1.1.4 Other Requirements

Many state requirements listed as ARARs are promulgated with identical or nearly identical requirements to federal law pursuant to delegated environmental programs administered by EPA and the state. The preamble to the NCP provides that such a situation results in citation to the state provision and treatment of the provision as a federal requirement.

There are other laws and regulations that have not been identified as ARARs for the site because they are not specifically related to environmental cleanup or facility siting. In most cases, the classification of a particular requirement as substantive or administrative will be clear, but some requirements may fall in the area between provisions related primarily to program administration and those concerned primarily with environmental and human health goals. Examples of other requirement sources of information are:

- *Occupational Health Act, Montana Code Annotated (MCA) 50-70-101 et seq., Administrative Rules of Montana (ARM) 17.74.101, ARM 17.74.102*
- *Employee and Community Hazardous Chemical Information Act, MCA 50-78-201, MCA 50-78-202, MCA 50-78-204*

3.1.1.5 Waivers of Specific ARARs

CERCLA Section 121(d)(4) authorizes that any ARAR may be waived under one of the following six conditions if the protection of human health and the environment is assured:

- It is part of a total remedial action that will attain such level or standard of control when completed (i.e. interim action waiver).

- Compliance with the ARAR at a given site will result in greater risk to human health and the environment than alternative options that do not comply with the ARAR.

- Compliance with such a requirement is technically impracticable from an engineering perspective.

- The remedial action will attain a standard or performance equivalent to that required by the ARARs through use of another method or approach.

- The ARAR in question is a state standard and the state has not consistently applied (or demonstrated the intention to consistently apply) the ARAR in similar circumstances at other sites.

- In meeting the ARAR, the selected remedial action will not provide a balance between the need for protection of public health and welfare and the environment at the site and the availability of Superfund monies to respond to other facilities.

3.1.2 Identification of ARARs

ARARs are defined as chemical-, location-, or action-specific. An ARAR can be one or a combination of all three types of ARARs.

Chemical-specific requirements address chemical or physical characteristics of compounds or substances on sites. These values establish acceptable amounts or concentrations of chemicals that may be found in or discharged to the ambient environment.

Location-specific requirements are restrictions placed upon the concentrations of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location-specific ARARs relate to the geographical or physical positions of sites, rather than to the nature of contaminants at sites.

Action-specific requirements are usually technology-based or activity-based requirements or limitations on actions taken with respect to hazardous substances, pollutants, or contaminants. A given cleanup activity will trigger an action-specific requirement. Such requirements do not themselves determine the cleanup alternative but define how chosen cleanup methods should be performed.

3.2 Preliminary Remedial Action Objectives

According to NCP (40 CFR 300.430(a)(1)(I)), the goal of the remedy selection process is "to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste." This FS considers the potential for current and future use of the site in the development of the PRAOs and PRGs for the various contaminated media.

3.2.1 Non-Residential Use

The property is bounded by the Kootenai River on the north, Highway 37 on the east, a commercial area (BNSF railroad thoroughfare) on the south, and a residential area on the west. Development of Area 1 into a recreational park is currently under consideration by the city's planning department; however, permanent future plans are unknown at this time. The city expects that David Thompson Search and Rescue will continue to utilize the northwest portion of the site. Area 2 will continue to serve recreational visitors; a change in land use is not currently anticipated per personal correspondence with Dan Theade, Supervisor of City Services, 2007.

In evaluating future land uses or activities at the site, the final condition of the site area must be considered. One of the primary methods to mitigate or limit the liberation of asbestos is to install an effective soil cover or remove and dispose the contaminated media to an offsite location. Soil covers are an effective means for limiting/containing the asbestos liberation. Certain activities such as off-road vehicle use could compromise soil covers. To limit such activities several measures can be implemented such as engineered or institutional controls that could eliminate or limit the exposure risks to asbestos or preserve the effectiveness of cover.

The final condition of the site after remediation must be considered in evaluating future land uses or activities and the related protection to human health that is provided. The expectation and assumption in this draft FS report is that the areas that are remediated would also result in acceptable risks for recreational uses (assuming the remedial measures put in place to address human health risks are kept intact). Land uses or activities that would compromise the remedial measures implemented under a remedial action would be considered unacceptable.

3.2.2 Objectives

LA present in vermiculite and/or soil poses an exposure risk to human receptors through inhalation of fibers released during active soil disturbance activities, inhalation of fibers in indoor air, and inhalation of fibers in outdoor (ambient) air. Non-cancer risks from inhalation of asbestos fibers have also been identified, but it is not currently evaluated quantitatively because a noncancer potency estimate is not currently available.

The PRAOs for the site presented below are initially based on anticipated future recreational use of the site:

1. Mitigate the potential for inhalation exposures to asbestos fibers that would result in risks that exceed the target cancer risk range specified by EPA of 1E-06 to 1E-04

2. Control erosion of contaminated soil by wind and water from source locations to prevent the spread of contamination to unimpacted locations and media

3. Ensure the remedy is compatible with future records of decision for other operable units within the Libby Asbestos Site.

4. Implement controls to prevent uses of the site that could compromise the remedy or pose unacceptable risks to human health or the environment

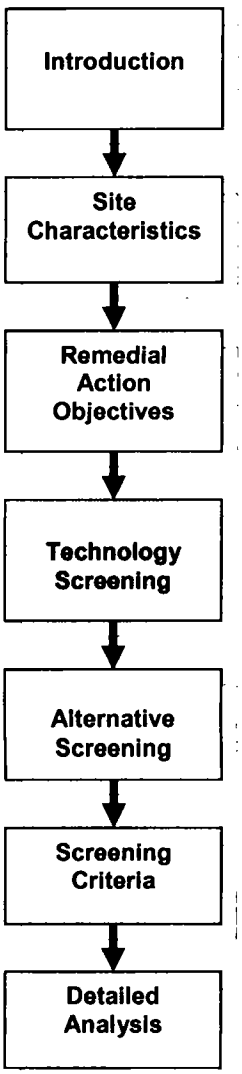
3.3 Preliminary Remediation Goals

PRGs are defined as the average concentration of a chemical or a contaminant in an exposure unit associated with a target risk level such that concentrations at or below the PRG do not pose an unacceptable risk. PRGs are not developed for the site at this time, because baseline risk assessments (BLRA and SLERA) for OU1 have not been completed. PRGs for the site will be developed once BLRA and SLERA are released for the OU1 site.

Section 4
Identification and Screening of General Response Actions, Remedial Technologies, and Process Options

4.1 Overview

This section identifies GRAs, remedial technologies, and process options that are potentially useful to address the PRAOs identified in Section 3 for the contaminated media. Screening of the GRAs, remedial technologies, and process options is then performed in accordance with the NCP to retain representative technologies and process options that can be assembled into remedial alternatives as discussed in Section 5.



The identification and screening process consists of the following general steps:

- Develop GRAs for the contaminated media that will satisfy the PRAOs identified in Section 3.
- Compile remedial technologies and process options for each GRA that are potentially viable for remediation of the contaminated media.
- Screen the remedial technologies and process options with respect to technical implementability for the contaminated media at the site. Technologies and process options that are not technically implementable relative to the contaminated media are eliminated from further consideration in this FS.
- Evaluate and screen the retained remedial technologies and process options with respect to effectiveness, ease of implementability, and relative cost. Technologies and process options that have low effectiveness, low implementability, or high cost relative to the contaminated media are eliminated from further consideration in this FS.
- Combine and assemble the retained technologies and process options for the contaminated media into site-wide remedial alternatives as presented in Section 5.

The remainder of this section categorizes the contaminated media and evaluates GRAs, technologies, and process options that are potentially viable for addressing the PRAOs and ARARs discussed in Section 3.

4.2 Contaminated Media

The purpose of this subsection is to identify the contaminated media that exhibit a potential risk to human health and the environment to facilitate identification of GRAs, remedial technologies, and process options that can be used to address the PRAOs.

The nature and extent of contamination within media at the site and the human health risks posed by the contaminated media are summarized in Section 2 and fully discussed in the RI report (CDM 2008).

Based on the RI report, the primary source of contamination at the site is LA. The SLERA and BLRA have not been completed; so it remains unknown whether LA contributes to ecological risks and human health risks at the site. Soil containing LA or visible vermiculite at the site are herein referred to together as "contaminated soils" as the contaminated medium. Distribution of contaminated soils at the site is shown in Figures 2-2 and 2-3. Due to high variability and uncertainty in the extent of contamination, LA detection vs. non-detection and visible vs. no visible vermiculite through out the site, it is assumed that the extent of contaminated soils include the entire OU1 site, i.e. Area 1 - Former Export Plant and Area 2 - Riverside Park.

4.3 General Response Actions

GRAs are initial broad response actions considered to address the PRAOs for the contaminated media identified as a concern at the site. GRAs include several remedial categories, such as containment, removal, disposal, and treatment of contamination within the media. Site-specific GRAs are first developed to satisfy the PRAOs for the contaminated medium and then are evaluated as part of the identification and screening of remedial technologies and process options for the contaminated medium.

The GRAs considered for remediation of the contaminant medium (i.e. contaminated soils) include the following:

- No action
- Monitoring
- Institutional controls
- Engineered controls
- Containment
- Removal, transport, and disposal
- Treatment

No action leaves contaminant media in their existing condition with no control or cleanup planned. In accordance with the NCP, this GRA must be considered to provide a baseline against which other options can be compared.

Monitoring involves physical measures applied to the site to determine if there is contaminant migration. Monitoring is not intended to substitute any engineering aspect of a selected remedy and does not physically address contaminants.

Institutional controls are administrative and legal restrictions intended to control or prevent present and future use of contaminated media. Institutional controls are not intended to substitute for engineering aspects of a selected remedy.

Engineered controls are physical restrictions intended to control or prevent present and future access to contaminant media.

Containment involves physical measures applied to contaminant media materials to control the release of contaminants and/or prevent direct contact or exposure to the contaminants.

Removal, transport, and disposal involve a complete or partial removal of contaminant media materials followed by transportation and disposal of the media materials at an onsite/offsite location.

Treatment involves biological, chemical, thermal, and/or physical measures applied to the contaminant media materials that reduce toxicity, mobility, and/or volume of the contaminants present.

4.4 Identification of Remedial Technologies and Process Options

In this step of the FS process, remedial technology types and process options that are capable of addressing the contaminated medium are identified and organized under each GRA listed in Section 4.3. This section provides potentially viable remedial technologies and process options for the contaminated medium.

Potentially viable remedial technologies and associated process options identified for the contaminant medium (i.e. contaminated soils) are presented and described on Table 4-1.

4.5 Screening of Remedial Technologies and Process Options for Technical Implementability

The remedial technologies and process options presented on Table 4-1 were first evaluated and screened based on technical implementability. The preliminary screening was very broad, looking at the suitability of a technology for addressing the contaminated media. The primary source of information used to perform preliminary screening is the Federal Remediation Technologies Roundtable (FRTR) Remediation Technologies Screening Matrix and Reference Guide, Version 4.0 (FRTR 2007). Other sources of information used for preliminary screening include previous studies and work conducted at the site, published literature and vendor information, and engineering judgment based on other asbestos related remediation projects.

A given technology or process option was eliminated from further consideration in this FS on the following basis:

- Technical implementability if site conditions or site characterization data indicated that the technology or process option is incompatible with the contaminant or contaminated media or cannot be implemented effectively due to physical limitations or constraints at the site.

- Some of the process options may be technically implementable on a small-scale basis for a specific location; however, the technical implementability screening and elimination were performed by evaluating use of the process options for the contaminated media on a large-scale, site-wide basis.

Each of the process options identified in Section 4.4 for the contaminated medium has been screened to eliminate those that are not implementable technically at the site. The process options for the contaminant medium eliminated from further consideration in this FS (with the rationale for elimination) are indicated on Table 4-1, using grey shading.

Remedial technologies and process options that are not deemed to be technically implementable relative to the contaminated medium were eliminated from further consideration. Retained technologies and process options were then carried forward to the second step of the evaluation process as discussed in Section 4.6.

4.6 Evaluation of Remedial Technologies and Process Options for Effectiveness, Implementability, and Relative Cost

Each of the technically implementable remedial technologies and process options retained from the preliminary screening process presented in Section 4.5 were further evaluated in the second step of the screening process for effectiveness, implementability, and relative cost. The criteria used, as defined in this step of the FS process, are described below.

Effectiveness
This evaluation of the effectiveness of a remedial technology or process option focuses on:

- Potential effectiveness in handling the estimated volumes of contaminated media and meeting the goals identified in the PRAOs

- Potential impacts to human health and the environment during construction and implementation

- How proven the remedial technology or process option is with respect to the contaminants and conditions at the site

Implementability
Technically implementable technologies and process options retained in Section 4.5 are evaluated with respect to both the technical and administrative feasibility of

implementing a remedial technology or process option. Technical implementability was used as an initial screening step in Section 4.5 to eliminate remedial technologies and process options that were clearly ineffective or unworkable at the site. This subsequent screening criterion places greater emphasis on the institutional aspects of implementability. This criterion focuses on:

- Ability to obtain permits for offsite actions
- Availability and capacity of treatment, storage, and disposal services
- Availability of necessary equipment and skilled workers

Relative Cost

Cost plays a limited role in the screening of remedial technologies and process options. Relative capital and operations and maintenance (O&M) costs are used rather than detailed estimates. The cost analysis is evaluated based on engineering judgment and is ranked relative to other process options in the same technology type.

Each remedial technology or process option was qualitatively evaluated using these three criteria to determine whether they should be eliminated from further consideration in the FS or retained for assembly into remedial alternatives. The following qualitative rating system was used in conjunction with the stated rationale to provide a justification for the ratings with respect to each criterion:

Effectiveness and Implementability		Relative Cost	
⓿	None	⓿	None
❶	Low	$	Low
❷	Low to Moderate	$$	Low to Moderate
❸	Moderate	$$$	Moderate
❹	Moderate to High	$$$$	Moderate to High
❺	High	$$$$$	High

Remedial technologies or process options deemed to have low effectiveness, low administrative implementability, and/or high relative cost for the contaminated medium are eliminated from further consideration in the FS.

Each of the process options retained from the first screening step presented in Section 4.5 for the contaminant medium has been evaluated using effectiveness, implementability, and relative cost and is presented on Table 4-2. This evaluation and screening process is inherently qualitative in nature. The evaluation criteria described in Section 4.6 are specified by EPA guidance; however the degree to which the criteria are weighted against each other are not specified. Determination of how the individual evaluation criteria should influence the overall rankings requires engineering judgment.

The factors considered for each of the three criterion that provide justification for retention or elimination are rated using the qualitative ratings system previously described and summarized on the tables. The process options for contaminant medium eliminated from further consideration in this FS (with the rationale for elimination) are indicated on the tables using grey shading.

4.7 Retained GRAs, Remedial Technologies, and Process Options

Based on the results of the two-step screening process described in Sections 4.5 and 4.6, a reduced number of remedial technologies and process options for the contaminated medium were retained for further evaluation and the development of remedial action alternatives as discussed further in Section 5. These retained remedial technologies and process options are presented on Table 4-3.

Retention of remedial technologies and process options to address the contaminated medium are for the following reasons:

- Remedial technologies/process options that have substantial potential and applicability as a stand-alone remedy and are being retained for further consideration

- Remedial technologies/process options that could provide remedial benefits in combination with other remedial technologies but would only have cost-effective application for specific site elements and particular conditions

It is unlikely that using or applying a single remedial technology/process option to the contaminated medium will solely be able to achieve the PRAOs or comply with ARARs. Thus, using various remedial technologies/process options in combination is likely to be necessary. Conventional and new (innovative) remedial methods are identified below.

Conventional Remedial Technologies/Process Options for Soils Contaminated with Asbestos

Conventional methods for remediation of soils contaminated with asbestos involve monitoring, exclusion from asbestos-contaminated areas and/or removing, transporting or containing (isolating) contaminated materials to eliminate airborne transport of asbestos fibers. The following conventional methods are involved in remediation strategies for asbestos contamination in soils included in this FS:

■ Monitoring	- Non-Intrusive Visual Inspection - Intrusive Visual Inspection - Sample Collection and Microscopic Analysis
■ Institutional Controls	- Governmental Controls, Proprietary Controls, and Informational Devices - Information and Education Programs
■ Engineered Controls	- Fencing and Posted Warnings
■ Removal	- Mechanical Removal (Excavation)
■ Transport	- Mechanical Transport (Hauling/Conveying) - Pneumatic Transport (Vacuum Truck/Pumping)
■ Containment	- Water-Based Suppression - Chemical-Based Suppression - Negative Pressure Enclosure - Soil or Rock Exposure Barrier/Cover - Asphalt or Concrete Exposure Barrier/Cover - Geosynthetic Multi-Layer Exposure Barrier/Cover
■ Disposal	- Offsite Disposal

Innovative Remedial Technologies/Process Options for Soils Contaminated with Asbestos

Several innovative remedial technologies/process options were evaluated during the screening process and warranted further consideration. One of these new remedial technologies/process options retained for assembly into remedial alternatives includes:

■ Thermal/Chemical Treatment	- Thermo-Chemical Treatment

Conventional and innovative remedial technologies/process options for contaminated soils are used in various combinations for assembly of remedial alternatives as discussed in Section 5.

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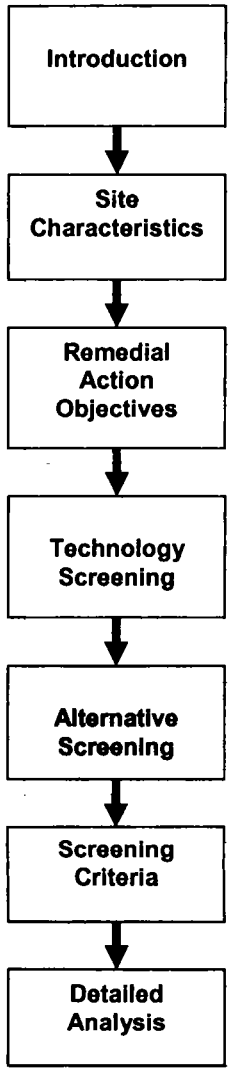
Section 5
Development and Screening of Alternatives

5.1 Overview

In this section, remedial action alternatives (herein referred to as remedial alternatives) are assembled by combining the retained remedial technologies and process options presented in Section 4 for the contaminated medium. Remedial alternatives are developed from either stand-alone process options or combinations of the retained process options.



These remedial alternatives are then screened using a qualitative process with standard evaluation to determine overall effectiveness, implementability, and cost. The purpose of alternative screening is to reduce the number of remedial alternatives retained for detailed analysis in Section 7.

The remedial alternatives for the site span a range of categories defined by the NCP as follows:

- No action alternative
- Alternatives that address the principal threats but involve little or no treatment; protection would be by prevention or control of exposure through actions such as containment and/or engineering and institutional controls
- Alternatives that, as their principal element, employ treatment that reduces the toxicity, mobility, or volume of the contaminants
- Alternatives that remove or destroy contaminants to the maximum extent, eliminating or minimizing long-term management
- Alternatives that include innovative treatment technologies

5.2 Assumptions Affecting Development of Remedial Alternatives

Several fundamental assumptions affect the development of remedial alternatives evaluated in this FS (other than a "no action alternative"). These assumptions are driven by requirements of the PRAOs identified in Section 3 and site limitations and constraints that can not be overcome by using one or more remedial technology/process options as described in Section 4. These fundamental assumptions were taken into consideration during development of remedial alternatives for this FS and include the items listed in Exhibit 5-1:

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives

Fundamental Assumption	Rationale
Land Use is Considered to be Recreational (Non-Residential)	Land use for Area 1 (Former Export Plant) and Area 2 (Riverside Park) as shown on Figure 1-3 is assumed to be recreational under all remedial alternatives except for Alternative 2. ■ It is assumed that the building on the northwest corner would continue to be used as a search and rescue facility operated by David Thompson. ■ It is assumed that all existing facilities like boat ramps, the pump house, and other utilities would be preserved and not removed. ■ It is assumed under Alternative 2 that all facilities (search and rescue building and pump house) and activities would be suspended or removed (relocated or demolished) and institutional and engineered controls would be implemented on site.
Exclusion of Baseline Risk Assessments from Alternative Evaluations	The BLRA and SLERA for OU1 are currently being prepared by EPA and SRC; thus, it is not possible to quantitatively assess the site's risks to human and ecological receptors at this time. This evaluation will occur in a future version of this document once the BLRA and SLERA for OU1 is available. Based on the conceptual site model (Figure 2-1), and previous remediation activities conducted at the Libby Asbestos Site, it is assumed that contaminated surface soils located onsite pose an exposure risk to human receptors primarily through inhalation of asbestos fibers.
Remedy Component Assumptions for Covers and Excavation/Disposal Consistent with Previous Interim Remedial Actions Performed for the Libby Asbestos Site	Numerous removal actions and interim remedial actions have been performed at the Libby Asbestos Site to address contamination posing an imminent risk to human health and the environment. Protocols for both covering contaminated soils and excavation and offsite disposal of contaminated soils have been developed. It is assumed that remedy components such as covers or excavation/disposal of contaminated soil will be consistent with the protocol developed for these previous actions. It is assumed for Alternative 3 that the thickness of the soil cover would be 18 inches (12 inches of subsoil and 6 inches of topsoil. Removal activities conducted at the Libby Asbestos Site involves an iterative process where initially the contaminated site is initially excavated to a depth of 12 inches. Depending upon the confirmatory soil sampling results, an interative excavation and sampling process will continue to a maximum depth of 36 inches. For this draft FS it is assumed that under Alternatives 4 and 5, excavation would cease at 12 inches bgs.

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Uncertain Compliance with Standards for Degree of Cleanup Included in National Emissions Standards for Hazardous Air Pollutants (NESHAP) - 40 CFR Part 61 Subpart M	NESHAP (40 CFR Part 61 Subpart M), specifically 61.151(a)(2) and (3), sets the standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. It states that the thickness of the soil cover used for containment of asbestos-containing waste material be 2 feet of compacted non-asbestos material and 6 inches of soil supporting vegetation. Identification of ARARs in this FS is tentative and has not been fully evaluated by EPA and DEQ. While compliance with this potential ARAR would be relatively straightforward, there may e impacts to other OUs. To be consistent with previous removal/interim remedial activities conducted at the Libby Asbestos Site, it is assumed that the cover thickness would be 18 inches (12 inches of subsoil and 6 inches of topsoil). Excavation backfill depths would be 12 inches (6 inches of subsoil and 6 inches of topsoil). All alternatives (except Alternative 1 and 2) presented in this FS would have the same issues of non-compliance with this potential ARAR. If determined to be an ARAR, the FS would be modified to address this ARAR or invocation of one of the ARAR waivers under CERCLA Section 121(d)(4) may be required (likely the fund-balancing waiver).
Comprehensive Approach of GRAs within Alternatives	The GRAs provided within the alternatives address the contaminated soils and risks for the site as a whole, i.e. a separate approach for Area 1 and Area 2 was not taken for alternatives evaluation. Combinations of GRAs to address specific site related issues will be addressed during identification of the preferred alternative after finalization of the FS and subsequent development of the proposed plan.
Remedial Action would Include All of Area 1 and Area 2 of the Site	It is assumed that due to high variability and uncertainty in the extent of contamination, LA detection vs. non-detection and visible vs. no visible vermiculite through out the site, the implementation of remedial action would include all of Area 1 (Former Export Plant) and Area 2 (Riverside Park).
Institutional Controls and Monitoring are Essential GRA Components of all Alternatives	Because of the potential future land uses described in Section 3, institutional controls would be required to prevent or restrict any activity or use that might pose a risk or compromise a remedy component due to the land uses. Monitoring would be required to ensure that the remedy components are not compromised and that institutional controls are being adhered to. Thus, it is assumed that institutional controls and monitoring are essential GRA components of all remedial alternatives (except the "no action" alternative required by the NCP).

Exhibit 5-1. Assumptions Affecting Development of Remedial Alternatives (continued)

Fundamental Assumption	Rationale
Monitoring Used to Determine Protectiveness and Need for Additional Remedial Measures	There is a possibility that the subsurface contaminated soils remaining in place below remedy components could be exposed in the future if the remedy components are disturbed or compromised after the implementation of a remedy. Based on the assumed exposure risk to human receptors, it is assumed that monitoring (consisting of inspections) will be performed to determine protectiveness of the remedy after implementation and the need for any future additional remedial measures. These additional remedial measures are excluded from the screening and evaluation of remedial alternatives since they would be a contingency measure.
30-year Period of Evaluation for all Alternatives	It is likely that all remedial alternatives will require an indefinite duration of operations and maintenance due to implementation of institutional controls and monitoring. However, evaluation of long durations of operations and maintenance is cumbersome and is generally not necessary for comparative evaluation between alternatives due to cost discounting under present value analysis. Thus, a default 30-year period of evaluation has been selected for all remedial alternatives.

Secondary factors and considerations have also been tentatively identified to aid development of remedial alternatives but are not fundamental controlling considerations. Since these considerations vary depending on the remedial approach used in each alternative, they are discussed in Section 7 for retained remedial alternatives.

5.3 Description of Remedial Alternatives

Remedial alternatives were assembled by combining the retained remedial technologies and process options. Table 5-1 provides a comprehensive list of the remedial technologies/process options that were used to develop each remedial alternative. The fundamental site assumptions and factors described in Sections 5.2 were also considered during development of the remedial alternatives.

The remedial alternatives evaluated for OU1 site include:

- Alternative 1: No Action
- Alternative 2: Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring
- Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring
- Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

- Alternative 5: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

The following subsections provide generalized descriptions of the remedy components for remedial alternatives to be evaluated during the screening process presented in this section. Detailed information for remedy components, including but not limited to specific quantities of contaminated materials and frequency and types of samples collected for analysis, are discussed in Section 7 for the alternatives retained after screening.

5.3.1 Alternative 1: No Action

A "no action" alternative is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared.

This alternative would discontinue all current remedial activities and no further action would be taken at the site for contaminated soils to address the associated risks to human health or the environment.

Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided. Monitoring (consisting solely of visual inspections) would be performed as necessary to complete the 5-year site reviews.

5.3.2 Alternative 2: Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring

Alternative 2 provides protection of human health through institutional controls (legal and administrative controls) coupled with engineered controls (physical controls such as fencing and signage) to restrict access and use of areas containing contaminated soils, rather than active cleanup of the site. Monitoring would be performed to ensure that these controls are protective of human health.

The institutional controls would be provided to protect the human health to the extent possible and protect the remedy (fencing and warning signs) put in place.

Physical barriers, such as fencing along with warning signs, would be used to exclude access to the site and areas with contaminated soils.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the engineered controls. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.

- Monitoring (consisting of inspections with sampling and microscopic analysis using methods such as those discussed previously in Section 2.5) would be

performed to ensure that protection of human health is maintained for areas outside of the fenced areas.

- Five-year site reviews would be performed since contaminated soils are left in place, preventing unrestricted use of the site.

5.3.3 Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Alternative 3 provides protection of human health through complete in-place containment (soil cover) of the contaminated surface soils within OU1, including Area 1 (Former Export Plant) and Area 2 (Riverside Park).

Covers used for in-place containment are assumed to be constructed from clean soil transported from an offsite borrow source outside of Libby valley tested for contamination.

The institutional controls would be provided to prevent or restrict any activities or uses of the site which could pose a risk to human receptors and to protect the remedy (soils covers) put in place.

Engineered controls such as physical barriers (fencing) and warning signs would not be required under this alternative.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the covers. As part of the O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.

- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (covers) placed at the site are intact and that protection of human health is maintained within the site.

- Five-year site reviews would be performed since subsurface contaminated soils are left in place, preventing unrestricted use of the site.

5.3.4 Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Alternative 4 provides protection of human health through removal (excavation) of the contaminated surface soils within OU1, including Area 1 (Former Export Plant) and Area 2 (Riverside Park), and offsite disposal of the removed soils at the former Libby vermiculite mine.

Removal of contaminated soils would be conducted to an assumed depth of 12 inches bgs. Removed soils would be transported offsite and placed within the former Libby vermiculite mine. Clean soil used to backfill removal areas would be transported from an offsite borrow source outside of the Libby valley tested for contamination. The backfill would be covered with topsoil and revegetated.

The institutional controls would be provided to prevent or restrict any activities or uses of the site which could pose a risk to human receptors and to protect the remedy (backfill) put in place.

Engineered controls such as physical barriers (fencing) and warning signs would not be required under this alternative.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the backfilled excavations. As part of O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.
- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (covers) placed at the site are intact and that protection of human health is maintained within the site.
- Five-year site reviews would be performed since contaminated soils are left in place, preventing unrestricted use of the site.

5.3.5 Alternative 5: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

Alternative 5 provides protection of human health through removal (excavation) of the contaminated surface soils within OU1, including Area 1 (Former Export Plant) and Area 2 (Riverside Park), and treatment of the removed contaminated soils at an offsite facility that demineralizes asbestos fibers using thermo-chemical conversion.

Removal of soils would be conducted to an assumed depth of 12 inches bgs. Removed soils would be transported to a permitted offsite treatment facility to undergo thermo-chemical conversion. TCCT, patented by ARI, is a commercial form of this technology. Contaminated soils would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. The resulting reaction product (rock-like material) is an inert material that is not fibrous like asbestos. Testing of the reaction product would be performed before removal from the treatment facility to ensure that it no longer poses risks to human health. Although studies have been performed by ARI to support this assertion (ARI 2007), the technology is relatively new so extensive sets of data are not available to demonstrate long-term irreversibility of the treatment process.

The treated inert material would then be transported back to the site and used as backfill material for the removal areas on the site. Clean soil from an offsite borrow source outside of the Libby valley tested for contamination would be used to supplement inert backfill material derived from the treatment process. The backfill surfaces would be covered with topsoil and revegetated.

The institutional controls would be provided to prevent or restrict any activities or uses of the site which could pose a risk to human receptors and to protect the remedy (backfill) put in place.

Engineered controls such as physical barriers (fencing) and warning signs would not be required under this alternative.

The protectiveness of this alternative would be maintained by conducting each of the following on a periodic basis:

- Long-term O&M would be performed to maintain the integrity of the backfilled excavations. As part of O&M, institutional controls would be evaluated and updated if necessary to ensure protectiveness.
- Monitoring (consisting of inspections such as those discussed previously in Section 2.5) would be performed to ensure that the integrity of the remedy components (backfilled excavations) at the site are intact and that protection of human health is maintained within the site.
- Five-year site reviews would be performed since contaminated soils are left in place, preventing unrestricted use of the site.

5.4 Screening Evaluation of Alternatives

5.4.1 Screening Criteria

The purpose of this screening evaluation is to reduce the number of proposed remedial alternatives that undergo a more thorough and extensive analysis as presented in Section 7. Because of this purpose, these alternatives are qualitatively evaluated using a smaller set of screening evaluation criteria than what is used for detailed evaluation of retained alternatives after screening. Per the NCP guidance, each of these proposed alternatives is screened using the short- and long-term aspects (where applicable) of three broad criteria: effectiveness, implementability, and cost.

5.4.1.1 Effectiveness

Effectiveness relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-2.

Exhibit 5-2. Effectiveness Criteria

Effectiveness Criteria
Overall protection of human health and the environment[1]
Compliance with ARARs[1]
Short-term effectiveness (during the remedial construction and implementation period)
Long-term effectiveness and permanence (following remedial construction)
Reduction of toxicity, mobility, or volume through treatment

[1] These criteria are referred to as "threshold criteria" that an alternative must meet to be viable (except the "no action" alternative); threshold criteria are described further in Section 6.0.

Effectiveness of each of the proposed alternatives is judged against the five effectiveness screening criteria using the qualitative ratings system in Exhibit 5-3.

Exhibit 5-3. Effectiveness Qualitative Ratings System

Effectiveness Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

5.4.1.2 Implementability

Implementability relates to the ability of the remedial alternative to satisfy screening evaluation criteria detailed in Exhibit 5-4.

Exhibit 5-4. Implementability Criteria

Implementability Criteria	
Technical feasibility	Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete
	Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete
Administrative feasibility	Ability to obtain approvals from other agencies
	Availability and capacity of treatment, storage, and disposal services
	Availability of property, specific materials and equipment, and technical specialists required for a remedial action

Implementability of each of the proposed alternatives is judged against the screening criteria using the qualitative ratings system presented in Exhibit 5-5.

Exhibit 5-5. Implementability Qualitative Ratings System

Implementability Ratings Categories	
⓿	None
❶	Low
❷	Low to moderate
❸	Moderate
❹	Moderate to high
❺	High

Determination that an alternative is not technically feasible will usually preclude it from further consideration. Negative factors affecting administrative feasibility will normally involve coordination steps to lessen the negative aspects of the alternative but will not necessarily eliminate an alternative from consideration.

5.4.1.3 Cost

Cost estimates prepared for screening alternatives are typically comparative estimates with relative accuracy so that cost decisions among alternatives are sustained as the accuracy of cost estimates improve in the detailed analysis of alternatives. The procedures used to develop cost estimates for alternative screening are similar to those used for detailed analysis; the differences are in the degree of alternative refinement and cost component development.

The focus of comparative screening estimates is to identify and include items that are essential to the alternatives that control the magnitude of the overall cost. Cost estimates at this step of the FS process are generally determined using cost curves, generic unit costs, vendor information, conventional cost-estimating guides, and prior similar estimates modified by site-specific information rather than detailed cost estimates. Both capital and O&M costs are considered in these estimates. Present value analyses are performed to discount all costs to a common base year. This is performed to fairly evaluate expenditures occurring over different time frames.

Because uncertainties with the definition of alternatives may remain in this step of the FS process, the costs developed for the screening analysis of these proposed alternatives are not held to the accuracy required for the detailed analysis of alternatives (i.e. +50 percent to -30 percent of actual costs). Typical cost accuracy ranges for alternative screening are +100 percent to -50 percent of actual costs.

There are specific GRAs for ACM that are essential components for each alternative that control the magnitude of costs for screening-level estimates. These specific GRAs for each alternative are listed below:

Alternative 1: Monitoring

Alternative 2: Monitoring, Institutional Controls, and Engineered Controls

Alternative 3: Monitoring, Institutional Controls, and Containment

Alternative 4: Monitoring, Institutional Controls, Removal, Transport, and Disposal

Alternative 5: Monitoring, Institutional Controls, Removal, Transport, and Treatment

It should be noted that only GRA components for ACM that are fundamental cost drivers for the alternative in question were included in the screening-level cost estimates. The specific process options included within each GRA to address ACM are identified on Table 5-1 and include tasks that are not specifically mentioned in the GRA. For instance, the GRA of "Transport" directly addresses the contaminated medium (soils), while transport of backfill required to construct covers is inherent to the process options that comprise the GRA of "Containment". Thus, the GRA of "Transport" is not mentioned separately for alternatives that strictly involve containment. Overall unit quantities (areas and volumes) required to develop costs for these items are presented in Appendix B.

The cost of each proposed alternative is rated on a comparative basis with other alternatives using a scale determined from the range of costs for the screened alternatives. Due to the likely alternative costs for the site, the cost ranges for the ratings categories are rather large. The cost rating categories are as follows in Exhibit 5-6:

Exhibit 5-6. Cost Qualitative Ratings System

Cost Ratings Categories		Cost Ranges (Present Value Dollars)
$	Low	Less than 2 million dollars
$$	Low to moderate	Between 2 million and 4 million dollars
$$$	Moderate	Between 4 million and 6 million dollars
$$$$	Moderate to high	Between 6 million and 8 million dollars
$$$$$	High	Greater than 8 million dollars

The evaluation and screening of each alternative using the three screening criteria are presented in Appendix C. This evaluation and screening process is inherently qualitative in nature (with the exception of approximate cost). The evaluation criteria described in Section 5.4 are specified by EPA guidance; however the degree to which the criteria are weighted against each other are not specified. Determination of how the individual evaluation criteria influence the overall rankings requires engineering judgment.

Generally alternatives with similar scope and essential components would have overall rankings that are similar, unless other considerations such as large differences in waste volumes or differing construction durations exist between them. Factors that affect the threshold criteria (overall protection of human health and the environment and compliance with ARARs) are given considerable weight in the overall ranking for effectiveness since alternatives must fully meet these criteria to be viable as a selected remedy. The threshold criteria are described in further detail within Section 6.

5.5 Summary of Alternatives Screening

Each alternative developed and described in Section 5.3 was evaluated to determine its overall effectiveness, implementability, and cost in Appendix C using the qualitative ratings system discussed in Section 5.4. Exhibit 5-7 summarizes the results for the screening of alternatives for the site.

Remedial alternatives deemed to have lower than moderate effectiveness, lower than moderate implementability, and/or high cost are eliminated from further consideration. The alternatives eliminated from further consideration in this FS are Alternatives 2 and 5 as indicated in Exhibit 5-7 using grey shading. The remaining alternatives are retained for detailed analysis as discussed in Section 5.6.

Exhibit 5-7. Summary of Alternatives Screening

Alternative	Description	Effectiveness	Implementability	Approx. Cost (Present Value Dollars)	
1	No Action	⓪	❺	$	$160,000
2	Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring	❷	❹	$	$700,000
3	In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring	❸	❸	$$	$3,830,000
4	Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring	❸	❷	$$$	$4,860,000
5	**Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring**	❸	❶	$$$$$	$24,410,000

Notes:

1. The alternatives screening process involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria presented in Appendix C. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, rankings for an alternative are not additive).
2. Shading indicates alternative has been eliminated from further consideration based on lack of effectiveness, lack of implementability, and/or elevated costs. Remaining (unshaded) remedial alternatives have been retained for detailed analysis in Section 7.0.
3. Screening cost spreadsheets (screening cost estimate summaries, and present value analyses) for each alternative are presented in Appendix D.

Legend for Qualitative Ratings System:

Effectiveness and Implementability		Cost (Present Value Dollars)	
⓪	None	⓪	None ($0)
❶	Low	$	Low ($0 through $2M)
❷	Low to Moderate	$$	Low to Moderate ($2M through $4M)
❸	Moderate	$$$	Moderate ($4M through $6M)
❹	Moderate to High	$$$$	Moderate to High ($6M through $8M)
❺	High	$$$$$	High (Greater than $8M)

5.6 Alternatives Retained for Detailed Analysis

Based on the screening of the alternatives in Section 5.5, the following alternatives were retained for detailed analysis as presented in Section 7.

- Alternative 1: No Action
- Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring
- Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

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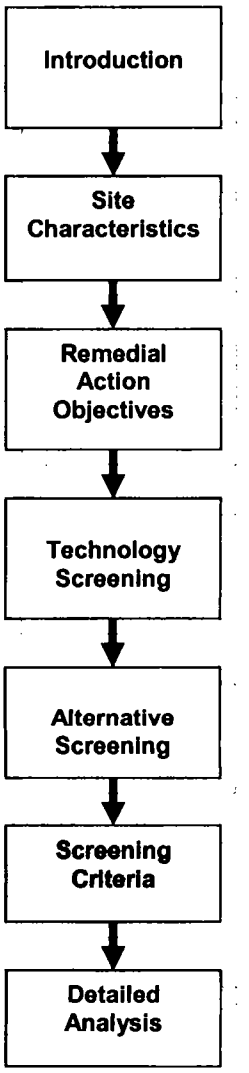
Section 6
Definition of Criteria Used in the Detailed Analysis of Retained Alternatives

The remedial alternatives retained after completion of the preliminary alternative screening step of the FS process (summarized in Section 5) are evaluated using nine evaluation criteria. These criteria were developed to address statutory requirements and considerations for remedial actions in accordance with the NCP and additional technical and policy considerations that have proven to be important for selecting among remedial alternatives (EPA 1988). The following subsections describe the nine evaluation criteria used in the detailed analysis of remedial alternatives and the priority in which the criteria are considered.



6.1 Overall Protection of Human Health and the Environment

Each alternative is assessed to determine whether it can provide adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site. Evaluation of this criterion focuses on how site risks are eliminated, reduced, or controlled through treatment, engineered controls, or institutional controls and whether an alternative poses any unacceptable cross-media impacts.

Criteria Used to Evaluate Remediation Alternatives Address Multiple Areas

- Protection of Human Health and Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

6.2 Compliance with ARARs

For this criterion, we evaluate each alternative to determine how chemical-, location-, and action-specific ARARs identified in Appendix A of this document will be met.

If the assessment indicates an ARAR will not be met, then the basis for justifying one of the six ARAR waivers allowed under CERCLA is discussed. These ARAR waivers are detailed in Exhibit 6-1.

Exhibit 6-1. ARAR Waivers

Waiver	Description
Interim Measures	The remedial action selected is only part of a total remedial action that will attain such level or standard of control when completed. (CERCLA §121(d)(4)(A).)
Greater Risk to Health and the Environment	Compliance with such requirement at the facility will result in greater risk to human health and the environment than alternative options. (CERCLA §121(d)(4)(B).)
Technical Impracticability	Compliance with such requirement is technically impracticable from an engineering perspective. (CERCLA §121(d)(4)(C).)
Equivalent Standard of Performance	The remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation through use of another method or approach. (CERCLA §121(d)(4)(D).)
Inconsistent Application of State Requirements	With respect to a state standard, requirement, criteria, or limitation, the state has not consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions. (CERCLA §121(d)(4)(E).)
Fund Balancing	In the case of a remedial action to be undertaken solely under section 104 using the fund, selection of a remedial action that attains such level or standard of control will not provide a balance between the need for protection of public health and welfare and the environment at the facility under consideration and the availability of amounts from the fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats. (CERCLA §121(d)(4)(F).)

6.3 Long-Term Effectiveness and Permanence

Long-term effectiveness evaluates the likelihood that the remedy will be successful and the permanence that it affords. Factors to be considered, as appropriate, include the following:

- Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their toxicity, mobility, or volume and propensity to bioaccumulate.

- Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site. This factor includes an assessment of containment systems and institutional controls to determine if they are sufficient to ensure that any exposure to human and ecological receptors is within protective levels. This factor also addresses the long-term reliability of management controls for providing continued protection from residuals, the assessment of the potential need to replace technical components of the alternative, and the potential exposure pathways and risks posed should the remedial action need replacement.

6.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Each alternative is assessed for the degree to which it employs technology to permanently and significantly reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site. Factors to be considered, as appropriate, include the following:

- The treatment processes the alternatives use and materials they will treat
- The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed
- The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment
- The degree to which the treatment is irreversible
- The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents
- Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action

6.5 Short-Term Effectiveness

This criterion reviews the effects of each alternative during the construction and implementation phase of the remedial action until remedial response objectives are met. The short-term impacts of each alternative are assessed, considering the following factors, as appropriate:

- Short-term risks that might be posed to the community during implementation of an alternative
- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures
- Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts
- Time until protection is achieved

6.6 Implementability

The technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation is evaluated under this criterion. The ease or difficulty of implementing each alternative will be assessed by considering the following factors detailed in Exhibit 6.2.

Exhibit 6-2 Implementability Factors to be Considered during Alternative Evaluation

Criterion	Factors to be Considered
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology Reliability of the technology, focusing on technical problems that will lead to schedule delays Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure
Administrative Feasibility	Activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies Availability of prospective technologies

6.7 Cost

Types of costs that are assessed for each alternative include the following:

- Capital costs
- Annual O&M costs
- Periodic costs
- Present value of capital and annual O&M costs

Cost estimates are developed according to *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000a). Flexibility is incorporated into each alternative for the location of remedial facilities, the selection of cleanup levels, and the period in which remedial action will be completed. Assumptions of the project scope and duration are defined for each alternative to provide cost estimates for the various remedial alternatives. Important assumptions specific to each alternative are summarized in the description of the alternative. Additional assumptions are included in the detailed cost estimates in Appendix G.

The levels of detail employed in making these estimates are conceptual but are considered appropriate for making choices between alternatives. The information provided in the cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives.

The costs are evaluated with respect to the following categories:

- Capital costs are those expenditures that are required to construct a remedial action. They are exclusive of costs required to operate or maintain the action throughout its lifetime. Capital costs consist primarily of expenditures initially incurred to build or install the remedial action (e.g., construction of a water treatment system and related site work). Capital costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as mobilization/demobilization; monitoring site work; installation of extraction, containment, or treatment systems; and disposal. Capital costs also include expenditures for professional/technical services that are necessary to support construction of the remedial action.

- Annual O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial action. These costs are estimated mostly on an annual basis. Annual O&M costs include all labor, equipment, and material costs (including contractor markups, such as overhead and profit) associated with activities, such as monitoring; operating and maintaining extraction, containment, or treatment systems; and disposal. Annual O&M costs also include expenditures for professional/technical services necessary to support O&M activities.

- Periodic costs are those costs that occur only once every few years (e.g., 5-year reviews, equipment replacement) or expenditures that occur only once during the entire O&M period or remedial time frame (e.g., site closeout, remedy failure/replacement). These costs may be either capital or O&M costs but, because of their periodic nature, it is more practical to consider them separately from other capital or O&M costs in the estimating process.

- The present value of each alternative provides the basis for the cost comparison. The present value cost represents the amount of money that, if invested in the initial year of the remedial action at a given rate, would provide the funds required to make future payments to cover all costs associated with the remedial action over its planned life. Future O&M and periodic costs are included and reduced by the appropriate present value discount rate as outlined in *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study (EPA 2000a)*. Per the guidance, the present value analysis was performed on remedial alternatives using a 7 percent discount (interest) rate over the period of evaluation for each alternative. Inflation and depreciation were not considered in preparing the present value costs.

6.8 State Acceptance

This criterion evaluates the technical and administrative issues and concerns the state may have regarding each of the alternatives. Assessment of state concerns will be completed after comments on the FS and proposed plan have been received by EPA and are addressed in the ROD. Thus, state acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.9 Community Acceptance

Assessment of concerns from the public will be completed after comments on the FS and proposed plan have been received by EPA and are addressed in the ROD. Thus, community acceptance is not considered in the detailed evaluation of alternatives presented in this FS.

6.10 Criteria Priorities

The nine evaluation criteria are separated into three groups to establish priority among these criteria during detailed evaluation of the remedial alternatives as detailed in Exhibit 6-3.

Exhibit 6-3. Criteria Priorities

Group	Criteria	Definition
Threshold Criteria	Overall Protection of Human Health and the Environment Compliance with ARARs	Must be satisfied by the remedial alternative being considered as the preferred remedy
Balancing Criteria	Long-Term Effectiveness and Permanence Reduction of Toxicity, Mobility, or Volume through Treatment Short-Term Effectiveness Implementability Cost	Technical criteria evaluated among those alternatives satisfying the threshold criteria
Modifying Criteria	State Acceptance and Community Acceptance	Not evaluated in this FS; evaluated after comments received on the FS and proposed plan

Section 7
Detailed Analysis of Retained Alternatives

7.1 Overview

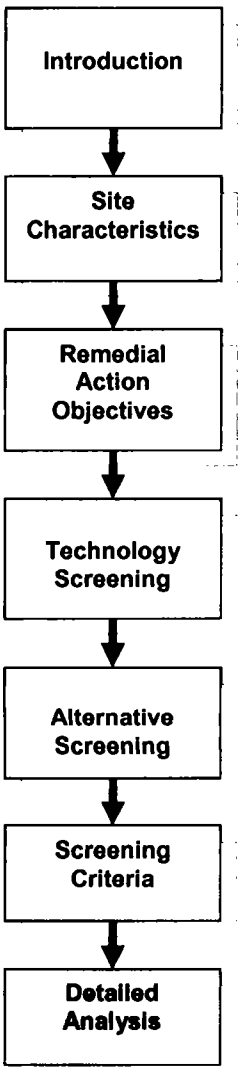
In this section, remedial alternatives retained in Section 5 undergo detailed analysis. During detailed analysis, each alternative is assessed using the two threshold criteria and five balancing criteria presented in Section 6. The results of the detailed analysis for each remedial alterative are then arrayed to perform a comparative analysis of the alternatives and identify the key tradeoffs between them.

The following alternatives were retained for detailed analysis in Section 7:

Alternative 1: No Action

Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring



7.2 Secondary Assumptions Affecting Detailed Analysis of Remedial Alternatives

Fundamental assumptions for all remedial alternatives used during alternative development and screening were presented in Section 5. However, there are numerous secondary assumptions that affect the detailed analysis of alternatives but are not fundamental controlling considerations. These assumptions are driven mainly by site limitations and constraints that can not be overcome by using one or more retained remedial technology/process options as described in Section 4. Some of these secondary assumptions are grouped into distinct categories and include the items listed in Exhibit 7-1.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives

Secondary Assumption Category	Secondary Assumption Description	Rationale
Containment (Soil Cover) Assumptions	Type and Thickness of Covers For In-Place Containment	The type of cover is assumed to be soil since soil covers are easily installed, borrow soil resources are available, and borrow soil is relatively inexpensive compared to other types of cover materials, such as geosynthetic materials or concrete/asphalt. As discussed in Exhibit 5-1, the thickness of the cover for in-place containment is assumed to be 18 inches (12 inches of subsoil and 6 inches of topsoil). This thickness will be confirmed and revised, if necessary, in future revisions of the FS.
	Cover Construction Over the Entire Site (Area 1 and Area 2)	Due to high variability and uncertainty in the extent of contamination throughout the site, it is assumed that the entire extent of the site will be addressed using soil covers under Alternative 3.
Removal Assumptions	Assumed Depth of Excavation	As discussed in Exhibit 5-1, the minimum depth of initial excavation for removal at the site is assumed to be 12 inches bgs. It is also assumed that no additional iterative excavation would be required after confirmatory sampling. These assumptions will be confirmed and revised, if necessary, in future revisions of the FS.
	Excavation of the Entire Site (Area 1 and Area 2)	Due to high variability and uncertainty in the extent of contamination throughout the site, it is assumed that the entire extent of the site will be excavated for removal under Alternative 4.
Hardscape vs. Softscape Assumptions	Sod (softscape) and Concrete (hardscape) Cover are Dictated by Traffic Intensity	The likely future land use of OU1 is a recreational park for the City of Libby and continued use of the search and rescue building. Since access to the park would be required, portions of OU1 used for vehicular traffic to be are classified as "high intensity traffic use" and would be "hardscaped" to protect the underlying remedy components (soil cover or backfilled areas). Areas that would not have vehicular traffic and would not need the additional protection for the underlying remedy components would be considered "low intensity traffic areas". For Alternatives 3 and 4 certain portions/areas of the site would be hardscaped (concrete) or softscaped (sod) after the remedy is put in place depending upon whether the areas have high intensity traffic use (consisting of motorized and non-motorized bikes, trucks and boat trailers, cars, etc.) or low intensity traffic use (consisting of pedestrians) respectively. Furthermore, it is currently assumed (in absence of detailed plans for the future park) that the percentage of surface area of the site dedicated to high intensity traffic use versus low intensity traffic use is 33% to 66%. These percentages will be confirmed and revised, if necessary, in future revisions of the FS.

Exhibit 7-1. Secondary Assumptions Affecting Refinement and Detailed Analysis of Remedial Alternatives (continued)

Secondary Assumption Category	Secondary Assumption Description	Rationale
Borrow Material Assumptions	Uncontaminated Subsoil and Topsoil Borrow Sources from Offsite Sources	All alternatives (except the "no action" alternative required by the NCP) would require the use of uncontaminated soil for construction (soil cover and clean backfill material). Onsite materials are not assumed because most of the site has the potential to be contaminated with LA and/or vermiculite. It is assumed that offsite subsoil borrow sources outside of the Libby valley used for the ongoing Libby cleanup efforts would also be used for the OU1 site remediation.
	Organic Materials for Topsoil from Offsite Sources	All alternatives (except the "no action" alternative required by the NCP) would require the use of uncontaminated topsoil for construction of covers and reclamation of excavated areas. It is assumed that topsoil would be manufactured from the clean borrow soil brought from offsite subsoil borrow source outside the Libby valley using organic materials derived from composting facilities.
Dust Suppression Assumptions	Water-Based Dust Suppression	Dust suppression measures would be implemented under all alternatives (except the "no action" alternative required by the NCP). Water is assumed to be used as the primary option for dust suppression to provide protection of human health and meet ARARs (i.e. keeping contaminated soils 'adequately wet'). It is also assumed the water will be used from the water pump house located onsite on Area 2 at no cost.
Offsite Disposal Assumptions	Assumptions for Use of Former Libby Vermiculite Mine	Alternatives 4 assumes offsite disposal of contaminated soils at the Former Libby Vermiculite Mine. This mine is currently being used for disposal of contaminated soils generated during ongoing cleanup activities performed for other operable units within the Libby Asbestos Site.
Assumption for Onsite Infrastructure	Assumptions for Onsite Facility and Buildings	It is assumed that under all alternatives (except the "no action" alternative required by the NCP), all the existing onsite facilities and buildings (search and rescue building and pump house) will be preserved during implementation of the remedial action.

Note: The list of secondary assumptions provided is a summary and is not all-inclusive; additional secondary assumptions are contained in Appendices B, E, and G.

7.3 Alternative 1: No Action

7.3.1 Remedial Alternative Component Descriptions

Alternative 1 is required by the NCP to provide an environmental baseline against which impacts of the various remedial alternatives can be compared. A summary of the remedial components of Alternative 1 is provided in Section 5.3.1. The following text provides additional detail about the remedial components of this alternative.

Alternative 1 would discontinue all current remedial activities, and no further action would be initiated at the site to address contaminated soils or otherwise mitigate the associated risks to human health or the environment.

The only actions that would be implemented for Alternative 1 are completion of 5-year site reviews as required by the NCP and monitoring (specifically non-intrusive visual inspections) required to support conclusions made in the 5-year site reviews. Non-intrusive visual inspections (i.e. surface inspections) performed in support of 5-year site reviews would be made on the entire area within the OU1 site boundary. Generalized descriptions of inspection and sampling methods are provided in Section 2.5, and details concerning the proposed monitoring protocol for Alternative 1 are provided in Appendix E.

7.3.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 1 is provided in Table F-1 using the evaluation criteria along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓪

7.3.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 1 is provided in Table F-2 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 1 is none. ⓪

7.3.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 1 is provided in Table F-3 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓪

7.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 1 is provided in Table F-4 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓪

7.3.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 1 is provided in Table F-5 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is none. ⓪

7.3.7 Implementability

Evaluation of implementability for Alternative 1 is provided in Table F-6 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 1 is high. ❺

7.3.8 Cost

Evaluation of cost for Alternative 1 is provided in Table F-7 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 1 is low. $

7.4 Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

7.4.1 Remedial Alternative Component Descriptions

Alternative 3 provides protection of human health through in-place containment (covering) of the contaminated surface soils within OU1, including Area 1 - Former Export Plant and Area 2 - Riverside Park. Institutional controls would be used to provide protection of human health to the extent possible and protect the remedy (covers) put in place. Monitoring would be used to ensure that these controls are protective of human health.

A description of the remedial components of Alternative 3 is provided in Section 5.3.3. The conceptual remedial configuration is presented in Figure 7-1. The following text provides additional detail about the remedial components of this alternative.

Alternative 3 employs covering the entire extent of OU1 site with 12 inches of clean soil cover and 6 inches of topsoil. Clean soils for the cover would be brought from an offsite borrow source area outside of Libby valley and would be analyzed for asbestos before use during construction. Water- or chemical-based suppression would be used during construction of the covers to prevent asbestos fibers from the contaminated soils from becoming airborne and potentially posing an inhalation exposure risk. Temporary laydown areas and gravel access roads would be constructed as necessary to limit disturbance of contaminated soils during construction of the covers. Existing riprap protection along the riverbank will be temporarily removed and relocated during the implementation of the remedy and replaced after the remedy is put in place as an erosion control measure along the riverbank. Orange construction fencing would be placed at the bottom of the cover to denote the extent of the cover constructed as part of this remedy. Long-term O&M would be required to maintain the integrity of the covers.

Certain portions/areas of the site (Area 1 and Area 2) would be hardscaped (concrete) and softscaped (sod) after the remedy is put in place depending upon whether it will have high intensity traffic use (consisting of motorized and non-motorized bikes, trucks and boat trailers, cars, etc.) or low intensity traffic use (consisting of pedestrians) respectively. Hardscape is being installed to protect the covers from uses that could decrease the effectiveness of the remedy.

Institutional controls would be employed to ensure covered areas are maintained and protected and provide access for future monitoring. It would also provide a means of notification if future subsurface construction like new foundations or utilities work is proposed within the covered areas. Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices. In general, it is anticipated that implementing and enforcing institutional controls would be relatively easy for the site since the City of Libby currently owns the property. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for the site.

Monitoring (consisting of inspections) would be performed routinely to ensure that protection of human health is maintained at the OU1 site. Monitoring protocol would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the covers; these are assumed to be performed annually as well as concurrently with 5-year site reviews. Generalized descriptions of inspection methods are provided in Section 2.5, and specific details concerning the monitoring protocol for Alternative 3 (including proposed types, and frequencies) are provided in Appendix E.

Community awareness programs would be put in place during implementation of the remedial action and during 5-year site reviews. Five-year site reviews would be performed for the OU1 site as described for Alternative 1 since contaminated soils are potentially left in place (below covers) preventing unrestricted use of the site.

Exhibit 7-2 provides a summary of the major remedial components for Alternative 3 requiring construction and the estimated quantities for these components.

Exhibit 7-2. Summary of Major Remedial Components and Associated Quantities for Alternative 3

Remedial Component	Unit	Estimated Quantity
Surface Area of Containment (Covers)	Acres	14
Common Backfill Required to Construct Covers	Loose Cubic Yards	24,400
Topsoil Required to Construct Covers	Loose Cubic Yards	8,150

Note: Quantities summarized in this exhibit are contained in Appendices B and G. Although detailed quantities have been provided, they should be considered approximate for FS evaluation purposes only.

7.4.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 3 is provided in Table F-8 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is moderate. ❸

7.4.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 3 is provided in Table F-9 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 3 is moderate to high. ❹

7.4.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 3 is provided in Table F-10 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is moderate. ❸

7.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 3 is provided in Table F-11 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is none. ❶

7.4.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 3 is provided in Table F-12 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is moderate. ❸

7.4.7 Implementability

Evaluation of implementability for Alternative 3 is provided in Table F-13 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 3 is low to moderate. ❸

7.4.8 Cost

Evaluation of cost for Alternative 3 is provided in Table F-14 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 3 (present value cost) is low to moderate. $$

7.5 Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

7.5.1 Remedial Alternative Component Descriptions

Alternative 4 provides protection of human health through removal (excavation the contaminated surface soils within OU1, including Area 1 - Former Export Plant and Area 2 - Riverside Park. Offsite disposal of the removed contaminated soils would be performed at the Former Libby Vermiculite Mine. Institutional controls would be used to provide protection of human health to the extent possible and protect the remedy put in place. Monitoring would be used to ensure that these controls are protective of human health.

A description of the remedial components of Alternative 4 is provided in Section 5.3.4. The conceptual remedial configuration is presented in Figure 7-2. The following text provides additional detail about the remedial components of this alternative.

Alternative 4 employs removal of contaminated surface soils from the entire extent of OU1 site to an assumed depth of 12 inches bgs. Specialized trucks (with covered tops) would be used to transport removed contaminated soils to the Former Libby Vermiculite Mine. This mine is been currently used for disposal of contaminated soils generated during ongoing cleanup activities performed in other OUs within the Libby Asbestos Site. Water- or chemical-based suppression would be implemented during removal to prevent asbestos fibers from the contaminated soils from becoming airborne and potentially posing an inhalation exposure risk. Temporary laydown areas and gravel access roads would be constructed as necessary to limit disturbance of contaminated soils during removal activities.

Clean soils for backfilling excavated areas would be brought from an offsite borrow source area outside of Libby valley and would be analyzed for asbestos and other contaminants before use during construction. Existing riprap protection along the riverbank will be temporarily removed and relocated during the implementation of the remedy and replaced after the remedy is put in place as an erosion control measure for the riverbank. Orange construction fencing would be placed at the bottom of the cover to denote the extent of the backfill placed as part of this remedy. Long-term O&M would be required to maintain the integrity of the backfilled areas.

Certain portions/areas of the site (Area 1 and Area 2) would be hardscaped (concrete) and softscaped (sod) after the remedy is put in place depending upon whether it will have high intensity traffic use (consisting of motorized and non-motorized bikes, trucks and boat trailers, cars, etc.) or low intensity traffic use (consisting of pedestrians) respectively. Hardscape is being installed to protect the backfilled areas from uses that could decrease the effectiveness of the remedy.

Institutional controls would be employed to ensure backfilled areas are maintained and protected and provide access for future monitoring. These controls would also provide a means of notification if future subsurface construction like new foundations or utilities work is proposed within the backfilled areas.. Institutional controls would consist of a combination of governmental controls, proprietary controls, and/or informational devices. In general, it is anticipated that implementing and enforcing institutional controls would be relatively easy for the site since the City of Libby currently owns the property. Issuance and periodic review and update of a comprehensive institutional control plan likely would be required to keep track of the various institutional control measures taken for the site.

Engineered controls such as physical barriers (fencing) and warning signs would not be required under this alternative.

Monitoring (consisting of inspections) would be performed routinely to ensure that protection of human health is maintained at the OU1 site. Monitoring protocol would include routine non-intrusive visual inspections (i.e. surface inspections) to ensure integrity of the remedy; these are assumed to be performed annually as well as concurrently with 5-year site reviews. Generalized descriptions of inspection methods are provided in Section 2.5, and specific details concerning the monitoring protocol for Alternative 4 (including proposed types, and frequencies) are provided in Appendix E.

Community awareness programs would be put in place during implementation of the remedial action and during 5-year site reviews. Five-year site reviews would be performed for the OU1 site as described for Alternative 1 since contaminated soils are potentially left in place (below clean backfill) preventing unrestricted use of the site.

Exhibit 7-3 provides a summary of the major remedial components for Alternative 4 requiring construction and the estimated quantities for these components.

Exhibit 7-3. Summary of Major Remedial Components and Associated Quantities for Alternative 4

Remedial Component	Unit	Estimated Quantity
Surface Area of Removal	**Acres**	14
Volume of Contaminated Soil Removed	**Loose Cubic Yards**	24,400
One-Way Distance to the Mine	**Miles**	13
Common Backfill Required for Excavations	**Loose Cubic Yards**	12,200
Topsoil Required for Excavations	**Loose Cubic Yards**	8,150

Note: Quantities summarized in this exhibit are contained in Appendices B and G. Although detailed quantities have been provided, they should be considered approximate for FS evaluation purposes only.

7.5.2 Overall Protection of Human Health and the Environment

Evaluation of overall protection of human health and the environment for Alternative 4 is provided in Table F-15 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is moderate. ❸

7.5.3 Compliance with ARARs

Evaluation of compliance with ARARs for Alternative 4 is provided in Table F-16 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. ARARs evaluated for this alternative are included in Appendix A. The overall rating on this criterion for Alternative 4 is moderate to high. ❹

7.5.4 Long-Term Effectiveness and Permanence

Evaluation of long-term effectiveness and permanence for Alternative 4 is provided in Table F-17 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is moderate. ❸

7.5.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Evaluation of reduction of toxicity, mobility, or volume through treatment for Alternative 4 is provided in Table F-18 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is none. ❶

7.5.6 Short-Term Effectiveness

Evaluation of short-term effectiveness for Alternative 4 is provided in Table F-19 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is low to moderate. ❷

7.5.7 Implementability

Evaluation of implementability for Alternative 4 is provided in Table F-20 using the evaluation criteria considerations along with the qualitative rating for each and the justification for the rating. The overall rating on this criterion for Alternative 4 is low to moderate. ❷

7.5.8 Cost

Evaluation of cost for Alternative 4 is provided in Table F-21 using the evaluation criteria considerations along with the cost rating for each and the justification for the rating. Detailed cost estimates for this alternative are included in Appendix G. The overall rating on this criterion for Alternative 4 (present value cost) is moderate. $$$

7.6 State (Support Agency) Acceptance

State (support agency) acceptance is a modifying criterion under the NCP. Assessment of state acceptance will not be completed until comments on the final FS report are submitted to EPA. Thus, state acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.7 Community Acceptance

Community acceptance is also a modifying criterion under the NCP. Assessment of community acceptance will include responses to questions that any interested person in the community may have regarding any component of the remedial alternatives presented in the proposed plan. This assessment will be completed after EPA receives public comments on the proposed plan during the public commenting period. Thus, community acceptance is not considered in the detailed analysis of alternatives presented in the FS.

7.8 Comparative Analysis of Alternatives

This FS evaluated the 3 retained remedial alternatives discussed in this section against the two threshold criteria and five balancing criteria. The results of the detailed analysis for each remedial alterative are presented in Exhibit 7-4 to allow a comparative analysis of the alternatives and identify the key tradeoffs between them.

Exhibit 7-4. Summary of Comparative Analysis of Alternatives

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria					
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)	
1	No Action	⓿	⓿	⓿	⓿	⓿	❺	$	$153,000
3	In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring	❸	❹	❸	⓿	❸	❸	$$	$3,371,000
4	Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring	❸	❹	❸	⓿	❷	❷	$$$	$4,294,000

Notes:

1. The detailed analysis of retained alternatives involves a qualitative assessment of the degree to which remedial alternatives address evaluation criteria presented in Appendix F. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess remedial alternatives (for instance, individual rankings for an alternative are not additive).
2. Detailed cost spreadsheets (cost summaries, present value analyses, and cost worksheets) for each alternative are presented in Appendix G.

Legend for Qualitative Ratings System:

Threshold and Balancing Criteria (Excluding Cost)		Balancing Criteria (Present Value Cost in Dollars)	
⓿	None	⓿	None ($0)
❶	Low	$	Low ($0 through $2M)
❷	Low to Moderate	$$	Low to Moderate ($2M through $4M)
❸	Moderate	$$$	Moderate ($4M through $6M)
❹	Moderate to High	$$$$	Moderate to High ($6M through $8M)
❺	High	$$$$$	High (Greater than $8M)

Using Exhibit 7-4, comparative analysis for the remedial alternatives using the threshold and balancing criteria has been put into narrative form in the following subsections. Only significant comparative differences between alternatives are presented; the full set of rationale for the qualitative ratings is provided in Appendix F.

7.8.1 Overall Protection of Human Health and the Environment

Of the 3 retained alternatives, only the "no action" alternative (i.e. Alternative 1) fails to provide protection for human health and the environment and did not address the PRAOs for contaminated soils. Thus, this alternative was given a rating of "none".

Alternative 3 address the PRAOs for contaminated soils through in-place containment using soil covers coupled with institutional controls to prevent contact with contaminated soils posing potential human health risks. Monitoring would be performed to ensure that the remedy components provide protection of human health after the remedy is put in place. Since contaminated soils still remain on site and could pose exposure risks if the remedy components are compromised, this alternative was given a rating of "moderate".

Alternative 4 address the PRAOs for contaminated soils through removal and offsite disposal with institutional controls to prevent contact with contaminated soils posing potential human health risks. Monitoring would be performed to ensure that protection of human health is ensured after the remedy is put in place. Contaminated soils still remain on site and could pose exposure risks if the remedy components are compromised. For this alternative, contaminated soils are removed and disposed offsite which slightly enhances long-term effectiveness and permanence, but due to increased volume of soil handling as compared to Alternative 3 it also reduces the short-term effectiveness of the alternative. Thus, this alternative was also given a rating of "moderate".

7.8.2 Compliance with ARARs

Alternative 1 fails to be compliant with the chemical-specific ARARs identified for the site since no action is taken. Thus, this alternative was given a rating of "none".

Alternatives 3 and 4 would address the chemical-, location, and action-specific ARARs through adherence of the ARARs during implementation of the remedial action. Based on the current assumptions, compliance with the potential ARAR of NESHAP 40 CFR Part 61 Subpart M 61.151(a)(2) and (3) may not be met without an ARAR waiver. Thus, these alternatives were given a rating of "moderate to high".

7.8.3 Long-Term Effectiveness and Permanence

Alternative 1 fails to provide long-term effectiveness and permanence since no action is taken. Thus, this alternative was given a rating of "none".

Alternative 3 provide protection of human health through in-place containment of contaminated soils using soil covers coupled with institutional controls to prevent contact with contaminated soils posing potential human health risks. Monitoring

would be performed to ensure that the remedy components provide protection of human health onsite. Since contaminated soils are covered but is otherwise left in place, residents could be exposed to the contaminated soils if the integrity of the cover is compromised. Thus, long-term effectiveness and permanence is not as certain as for remedies that completely remove contaminated soils from the site. Thus, these alternatives were given a rating of "moderate".

Alternative 4 provide protection of human health through removal of contaminated soils and offsite disposal with institutional controls to prevent contact with residual contaminated soils posing potential human health risks. Monitoring would be performed to ensure that protection of human health is ensured after the remedy is put in place. Even though the contaminated soils are removed (to an assumed depth of 12 inches) and disposed offsite, long-term effectiveness and permanence of this alternative for the site is not certain because contaminated soils below the removal depths, if disturbed, could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). Thus, this alternative was also given a rating of "moderate".

7.8.4 Reduction of Toxicity, Mobility, or Volume through Treatment

All of the retained alternatives fail to provide a reduction of toxicity, mobility, or volume through treatment since treatment is not a component of these alternatives. Thus, all of the retained alternatives were given a rating of "none".

7.8.5 Short-Term Effectiveness

Alternative 1 fails to provide short-term effectiveness since no action is taken. Thus, this alternative was given a rating of "none".

Alternative 3 addresses the short-term risks to workers, the community, and the environment. Institutional controls could be quickly implemented to address potential exposure by the community to contaminated soils. Construction of covers would be implemented shortly after the implementation of institutional controls to protect the community and the environment. Duration of construction of covers would be shorter in comparison to Alternative 4 and short-term risks to workers would be mitigated through the use of safety measures such as water-based dust suppression and PPE. Trucks used to haul offsite borrow used to construct the covers slightly increases short-term risks to the community. Thus, this alternative was given a rating of "moderate".

Alternative 4 require removal of contaminated soils and offsite disposal with institutional controls to prevent contact with residual contaminated soils posing potential human health risks. Monitoring would be performed to ensure that protection of human health is ensured after the remedy is put in place. Removal and offsite disposal requires disturbance of a large amount of contaminated soils, which poses increased short-term risks to workers as well as to the surrounding community. In addition to trucks hauling contaminated soils offsite, trucks for hauling offsite backfill material are also required, which poses additional risks to workers and the

community. Since this alternative requires much more disturbance of the contaminated soils as compared to the Alternative 3, short-term impacts to workers and the community are increased. Thus, this alternative was given a rating of "low to moderate".

7.8.6 Implementability

Alternative 1 has no action taken other than 5-year site reviews, which can be readily implemented. Thus, this alternative was given a rating of high.

Alternative 3 requires in-place containment of contaminated soils using soil covers covering the entire OU1 site. The construction resources and materials needed to construct the cover for this alternative should be available. Maintenance of the covered areas and monitoring would be relatively easy. However, a large amount of offsite borrow would be required to construct the covers from an offsite source outside of the Libby valley. Thus, this alternative was given a rating of "moderate".

Alternative 4 primarily involve removal of contaminated soils covering the entire OU1 site and offsite disposal with institutional controls and monitoring to prevent contact with residual contaminated soils posing potential human health risks. Removal and offsite disposal of contaminated soils could be difficult in areas close to structures and utilities. Under this alternative approximately twice the volume of material requires handling (offsite hauling of excavated contaminated soils and hauling in of clean backfill material) as compared to Alternative 3. Overall implementability of this alternative is lower than Alternative 3. Thus, this alternative was given a rating of "low to moderate".

7.8.7 Cost

Present value costs for all alternatives were evaluated over a 30-year period (Years 1 through 30).

The present value cost for Alternative 1 was given a rating of "low". The present value cost for this alternative is approximately $153,000.

The present value cost for Alternative 3 was given a rating of "low to moderate". The present value cost for this alternative is approximately $3,371,000.

The present value cost for Alternative 4 was given a rating of "moderate". The present value cost for this alternative is approximately $4,294,000.

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Section 8
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Tables

Table 4-1

Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
No Action	None	None	No action would be taken. Contaminated soils would remain in their existing conditions.	Required by NCP as baseline for comparison.	Yes
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of asbestos containing soils.	Potentially implementable process option.	Yes
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of asbestos containing soils.	Potentially implementable process option.	Yes
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	Potentially implementable process option.	Yes
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soils would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants; incase the city of Libby decides to transfer the property to a private ownership. Examples of informational devices (ensure the overall reliability of other controls) include but are not limited to state registries of contaminated properties, deed notices, and advisories.	Potentially implementable process option.	Yes
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soils.	Potentially implementable process option.	Yes
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soils would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	Potentially implementable process option.	Yes
Containment	Surface Source Controls	Water-Based Suppression	Contaminated soils would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	Potentially implementable process option.	Yes

Table 4-1 (continued)
Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Containment – Continued	Surface Source Controls – Continued	Chemical-Based Suppression	Contaminated soils would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	Potentially implementable process option.	Yes
		In Situ Mixing	Contaminated soils would be mixed with underlying uncontaminated soil or fill materials.	Potentially implementable process option.	Yes
		Soil or Rock Exposure Barrier/Cover	Contaminated soils would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soils would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soils would be covered with geosynthetic material (such as geomembrane or a geosynthetic clay liner [GCL]) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	Potentially implementable process option.	Yes
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soils would be removed using mechanical excavation methods.	Potentially implementable process option.	Yes
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soils would be transported by truck or other mechanical conveyance method.	Potentially implementable process option.	Yes
		Hydraulic Transport (Slurrying)	Contaminated soils would be transported in slurry form using a pipeline or other hydraulic conveyance system.	Potentially implementable process option.	Yes
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soils would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Potentially implementable process option.	Yes
	Disposal	Onsite Disposal	Removed contaminated would be disposed of at an onsite location authorized for disposal of asbestos.	Not technically feasible for site application because the site has limited space and onsite consolidation facility can not be build.	No
		Offsite Disposal	Removed contaminated soils would be disposed of at the Former Libby Asbestos Vermiculite Mine.	Potentially implementable process option.	Yes
Treatment	Biological Treatment	Vermiprocess	Worms are employed to convert contaminated soils into a non-regulated material.	Not technically feasible for site application because it has not been demonstrated for large-scale remediation of ACM and associated soils.	No
		Phytoremediation	Contaminated soils would be treated/removed using select plant species.	Not technically feasible for site application because no plant has been identified that can remove asbestos from ACM and associated soils through phytoremediation.	No

Table 4-1 (continued)

Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Treatment – Continued	Chemical and/or Physical Treatment	Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated soils would be mixed with a pozzolan- or cement-based binding agent before disposal.	Potentially implementable process option.	Yes
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated soils would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	Potentially implementable process option.	Yes
		Chemical Decomposition	Contaminated soils would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as a non-regulated waste. ABCOV™ is a demonstrated form of this technology.	Potentially implementable process option.	Yes
		Chemical Digestion	ACM and associated soils would be treated using a spray-applied foam that soaks into porous materials and converts chrysotile asbestos contained within to an inert, non-fiberous form. DMA® is a commercial form of this technology.	Not technically feasible for site application because the technology is only applicable to chrysotile asbestos-containing porous materials that can readily absorb the digestion agent and does not affect amosite asbestos.	No
		Soil Washing	ACM-associated soils would be flushed with a site-specific washing solution; flushed asbestos would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soils.	No
		Soil Flushing	A washing solution (as with soil washing) would be circulated through ACM-associated soils with the use of injection and extraction wells or trenches; flushed asbestos would be collected for further treatment and/or disposal.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soils.	No
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated soils to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	Potentially implementable process option.	Yes
		Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated soils placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes

Table 4-1 (continued)
Identification and Technical Implementability Screening of Potentially Applicable Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Screening Comments*	*Retained*
Treatment – Continued	Thermal Treatment – Continued	Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated soils placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	Potentially implementable process option.	Yes
		Incineration (Ex Situ)	Vermiculite and associated soils would be crushed and mixed. The mixture is subjected to incineration without chemical additives. The reaction product is an inert waste.	Not technically feasible for site application because it has not been identified or demonstrated for remediation of ACM and associated soils.	No
	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated soils would be placed into a high temperature caustic (strong basic) solution. Asbestos fibers are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted asbestos fibers are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	Potentially implementable process option.	Yes
		Thermo-Chemical Treatment	Contaminated soils would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. Thermo-chemical conversion technology (TCCT), patented by ARI Technologies Inc., (ARI) is a commercial form of this technology.	Potentially implementable process option.	Yes

Notes:

1. The screening process for technical implementability involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.5.
2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of technical implementability. Remaining (unshaded) remedial technologies/process options have been retained for additional screening in Table 4-2.

Table 4-2

Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness	Implementability	Relative Cost		Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
						Capital Cost	O&M Cost		
No Action	None	None	No action would be taken. Contaminated soils would remain in their existing conditions.	⓪ No protection of human health or the environment and no compliance with ARARs.	⓪ Easily implemented but is not acceptable to regulatory agencies and does not meet ARARs.	⓪	⓪	Retained	Required by NCP as stand-alone alternative.
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of asbestos containing soils.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor resources.	$	⓪	Retained	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of asbestos containing soils.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor resources.	$$	⓪	Retained	Viable for short- and long-term site monitoring.
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	❷ Protects human receptors by monitoring contaminant concentrations and migration. Does not directly affect receptors and does not physically address contaminants.	❺ Easily implemented using available technical labor and equipment resources.	$$$	⓪	Retained	Viable for short- and long-term site monitoring.
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soils would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants; incase the city of Libby decides to transfer the property to a private ownership. Examples of informational devices (ensure the overall reliability of other controls) include but are not limited to state registries of contaminated properties, deed notices, and advisories.	❷ Restricts future uses of the site that are not protective of human health and the environment but does not physically address contamination.	❸ Implemented using legal instruments and labor resources; potential public resistance.	$$	$	Retained	Potentially viable process option for combination with engineered controls or contaminated soils containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soils.	❷ Protects human receptors by enhancing awareness of potential site hazards and remedies. Does not directly affect ecological receptors and does not physically address contamination.	❺ Easily implemented using available technical and community involvement labor resources.	$	$	Retained	Potentially viable process option for combination with all other technologies.
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soils would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	❷ Protects human receptors through warnings and restricted access through fencing though human receptors may choose to ignore warnings and circumvent fencing. Does not directly affect many types of ecological receptors that can circumvent fencing.	❺ Easily implemented and resources readily available.	$$	$	Retained	Potentially viable process option for combination with institutional controls or contaminated soils containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.

Table 4-2 (continued)
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Effectiveness*	*Implementability*	*Relative Cost*		*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
						Capital Cost	*O&M Cost*		
Containment	Surface Source Controls – Continued	Water-Based Suppression	Contaminated soils would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	❸ Wetting contaminated soils for dust suppression inhibits asbestos fiber transport by air, but frequent wetting may facilitate asbestos transport through surface runoff. Does not provide long-term effectiveness without continuous re-application.	❹ Easily implemented and construction resources readily available. A suitable water supply must be located. Requires continuous re-application to ensure protectiveness.	$$	$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soils removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated soils would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	❸ Chemically treating contaminated soils inhibits LA fiber transport by air. Does not provide long-term effectiveness without frequent re-application.	❸ Implementable and construction resources readily available. May be difficult to ensure uniform application of the chemical suppressant over the contaminated soils. Requires frequent re-application to ensure protectiveness.	$$$	$$$	Retained	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soils removal, disposal, and/or treatment technologies.
		In Situ Mixing	**Contaminated soils would be mixed with underlying uncontaminated soil or fill materials.**	❶ **Reduces future asbestos releases from surface soils after implementation; however, there is potential for subsurface contaminated soils to migrate back to the surface over time through natural and/or human activities. It does not protect receptors by itself.**	❷ **Implemented using available construction resources. Difficulty may be encountered in homogenizing contaminated soils with underlying soils and depth to bedrock may preclude in situ mixing at some locations. May require re-application over time if subsurface contaminated soils migrates to the surface. Must be combined with institutional and engineered controls.**	$$$$	$$	Effectiveness, Implementability	Eliminated from consideration.
		Soil or Rock Exposure Barrier/Cover	Contaminated soils would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soils erosion and LA fiber transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$	$$	Retained	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soils would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soils erosion and LA fiber transport by air and water.	❹ Implemented using available construction resources and materials. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soils would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	❹ Protects receptors by eliminating surface exposure of contaminants. Prevents contaminated soils erosion and LA fiber transport by air and water.	❸ Implemented using available construction resources; however, special material and labor resources are required to install the geosynthetic material. Care must be taken during installation to avoid damage to the geosynthetic. Must be combined with institutional and engineered controls. Requires some maintenance for long-term protectiveness.	$$$$	$$$	Retained	Viable as a long-term solution.
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soils would be removed using mechanical excavation methods.	❹ Protects receptors by eliminating future exposure to contaminated soils and migration of LA fibers after implementation. Must be combined with containment, transport, disposal, and/or treatment technologies.	❸ Implemented using available construction resources. Must be combined with source controls during implementation to provide protection to workers and the environment.	$$$$	⓪	Retained	Viable as a long-term solution; must be combined with contaminated soils transport, disposal, and/or treatment technologies.
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soils would be transported by truck or other mechanical conveyance method.	❸ Protects receptors by eliminating future exposure to contaminated soils and migration of LA fibers after implementation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❹ Easily implemented using available construction resources; efficient for all sizes of materials. Useful for onsite or offsite actions. Must be combined with source controls during implementation to provide protection to workers and the environment.	$$$$	⓪	Retained	Viable as a long-term solution; must be combined with contaminated soils removal, disposal, and/or treatment technologies.

Table 4-2 (continued)
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Effectiveness*	*Implementability*	*Relative Cost*		*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
						Capital Cost	*O&M Cost*		
Removal, Transport, Disposal - Continued	Transport – Continued	Hydraulic Transport (Slurrying)	Contaminated soils would be transported in slurry form using a pipeline or other hydraulic conveyance system.	❸ Protects receptors by eliminating future exposure to contaminated soils and migration of LA fibers after implementation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❷ Efficient for soils and gravel or smaller particle sizes. Only useful for onsite actions. Difficult to transport large size contaminated soils and debris materials or may require higher flow velocities, which can cause more abrasive wear on equipment. Treatment of water used for transport would be required. Grinding or pulverizing of large size contaminated soils and debris for hydraulic transportation would be required and may conflict with ARARs.	$$$$	⓪	Implementability	Eliminated from consideration.
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soils would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	❸ Protects receptors by eliminating future exposure to contaminated soils and migration of LA fibers after implementation. Effective in performing removal of small and fine material during excavation. Must be combined with removal, containment, disposal, and/or treatment technologies.	❸ Efficient for soils and gravel or smaller particle sizes; however, filtering and containment of air stream would be required. Only useful for onsite actions. High abrasive wear on equipment may occur depending on type of job performed. Grinding or pulverizing of large size contaminated soils and debris transportation would be required and may conflict with ARARs. This concern can be eliminated if used for finer or smaller sized contaminated soils.	$$$$	⓪	Retained	Viable as a long-term solution; must be combined with contaminated soils removal, disposal, and/or treatment technologies.
	Disposal	Offsite Disposal	Removed contaminated soils would be disposed of at the Former Libby Asbestos Vermiculite Mine.	❹ Protects receptors by eliminating exposure to contaminated soils and migration of LA fibers at original location and provides containment of contaminated soils within an engineered disposal facility. Must be combined with removal, transport, and/or treatment technologies.	❹ Implemented using the Former Libby Asbestos Vermiculite Mine.	$$$$$	⓪	Retained	Viable as a long-term solution; must be combined with contaminated soils removal and transport technologies.
Treatment	Chemical/Physical Treatment	Pozzolan- or Cement-Based Stabilization/Solidification	Contaminated soils would be mixed with a pozzolan- or cement-based binding agent before disposal.	❹ Protects receptors by eliminating exposure to asbestos and migration of contaminated soils. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking. Must be combined with removal, transport, and disposal technologies.	❷ Implemented using available construction resources. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with heterogeneous vermiculite debris and soil. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓪	Implementability, Cost	Eliminated from consideration.
		Pozzolan- or Cement-Based In Situ Stabilization/Solidification	Contaminated soils would be mixed in situ with a pozzolan- or cement-based binding agent using a deep soil auger mixing/injection technique.	❹ Protects receptors by eliminating exposure to LA and migration of LA. Contaminated soils would be treated in place, which minimizes exposure to receptors and the environment. Effectiveness of stabilization may decrease over time due to development of freeze-thaw cracking.	❶ Implemented using available construction resources. Debris piles are scattered over site, which include large quantities of contaminated soils that vary in depth and extent. Difficult to obtain and transport large quantities of binding agent and homogenize binding agent with vermiculite debris and soil. Depth to bedrock may preclude in situ mixing at some locations.	$$$$$	⓪	Implementability, Cost	Eliminated from consideration.

Table 4-2 (continued)
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

General Response Actions	Remedial Technology	Process Option	Description of Option	Effectiveness	Implementability	Relative Cost: Capital Cost	Relative Cost: O&M Cost	Reasons for Elimination of Process Option from Consideration	Process Option Viability with Respect to Assembly of Remedial Alternatives
Treatment – Continued	Chemical/Physical Treatment – Continued	Chemical Decomposition	Contaminated soils would be decomposed to an amorphous silica suspension at relatively low temperatures (~100°C) using chemicals tailored to the waste stream. The resulting amorphous silica would then be solidified for disposal as a non-regulated waste. ABCOV™ is a demonstrated form of this technology.	❹ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies.	❶ Implemented using a patented and demonstrated technology; however, commercialization of the technology is not fully developed. There is only one vendor in the U.S. offering this technology, which requires special chemicals tailored to the waste stream. The treatment process requires physical separation/segregation of contaminated soils into similar materials and associated soils and adjustment of the chemicals for the waste streams. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓪	Implementability, Cost	Eliminated from consideration.
	Thermal Treatment	In Situ Vitrification	An electrical current would be passed between electrodes inserted into in-place contaminated soils to cause melting. The melted matrix is then allowed to cool in place into a solid vitrified glass mass.	❸ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Contaminated soils would be treated in place, which minimizes exposure to receptors and the environment during implementation. Effectiveness is highly dependent on the nature of the subsurface; heterogeneity of the vermiculite and soils, lack of groundwater, and variable depth to bedrock would impact effectiveness.	❶ Implemented using a patented, demonstrated, and commercialized technology. The technology requires a significant, reliable source of electrical power. Difficult to implement since technology is mainly dependent on the electrical conductivity of the subsurface; contaminated soils are highly heterogeneous. Lack of saturated soils in the subsurface hinder the implementation of this technology. Depth to bedrock may also complicate in situ vitrification at some locations. The system requires off-gas treatment system to address air emissions.	$$$$$	⓪	Implementability, Cost	Eliminated from consideration.
		Electric Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes in a furnace creating an electrical arc. Contaminated soils placed in the furnace form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❹ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies. Offsite transportation of contaminated soils could negatively impact the community.	❶ Implemented using a patented, demonstrated, and commercialized technology. However, the literature does not indicate that electric arc furnace units are widely available commercially for remediation of contaminated soils. Thus, contaminated soils would be required to be transported off site for treatment (one demonstration location identified is in New Jersey). Mobilization of a temporary onsite treatment facility is possible but has not been demonstrated in the literature and could pose numerous setup and startup difficulties. The technology requires a significant, reliable source of electrical power. The contaminated soils require size reduction before it is put in the furnace for vitrification. The system requires off-gas treatment system to address air emissions. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soils.	$$$$$	⓪	Implementability, Cost	Eliminated from consideration.

Table 4-2 (continued)
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Effectiveness*	*Implementability*	*Relative Cost*		*Reasons for Elimination of Process Option from Consideration*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
						Capital Cost	*O&M Cost*		
Treatment – Continued	Thermal Treatment – Continued	Plasma Arc Vitrification (Ex Situ)	An electrical current would be passed between electrodes to form plasma. Contaminated soils placed in the plasma arc form a molten bath that cools to form a vitrified glass mass. The vitrified glass mass is an inert waste.	❺ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transportation technologies.	❶ Implemented using a patented, demonstrated, and commercialized technology. Currently the technology is not available in the U.S. to treat large volumes of contaminated soils. The sole vendor available in the U.S. has commercial portable units, which can only treat very small volumes of contaminated soils. The technology requires a significant, reliable source of electrical power. The contaminated soils requires size reduction before it is put in the furnace for vitrification. The system also requires an off-gas treatment system. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soils.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
	Thermal/Chemical Treatment	Thermo-Caustic Dissolution	Contaminated soils would be placed into a high temperature caustic (strong basic) solution. Asbestos fibers are partially to fully converted (changed to an amorphous structure) during immersion. Partially converted asbestos fibers are further converted using chemical reactions to form a viscous mixture, which is later vitrified. The resulting reaction product (glass) is an amorphous inert waste.	❹ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Once treated, the non-regulated material and soil can be used for site restoration. Must be combined with removal and transport technologies.	❶ Implemented using a patented and demonstrated technology jointly developed by the U.S. Department of Energy (DOE) and their contractors for specialized use on DOE facilities. This technology is not commercially available. The high temperature caustic solution poses potential difficulties and risks to workers during the first stage of the process. The contaminated soils requires size reduction before it is put into the caustic solution. The vitrification portion of the technology requires a significant, reliable source of electrical power. The system also requires an off-gas treatment system. Containment technologies required to protect receptors and the environment from release of LA fibers during initial processing of contaminated soils.	$$$$$	⓿	Implementability, Cost	Eliminated from consideration.
		Thermo-chemical Treatment	Contaminated soils would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI is a commercial form of this technology.	❹ Protects receptors by converting contaminated soils to an inert form. The treatment is irreversible. Once treated, the inert material and soil can be used for site restoration. Must be combined with removal and transport technologies. Offsite transportation of contaminated soils could negatively impact the community.	❸ Implemented using a patented, demonstrated, and commercialized technology (TCCT). Currently the contaminated soils would be required to be transported off site for treatment to the closest operating TCCT facility in Washington State. Mobilization of a temporary onsite treatment facility is possible but with high cost. The contaminated soils requires size reduction before it is put in the furnace for thermo-chemical conversion. The treatment process does not require physical separation/segregation of contaminated soils into similar materials and associated soils. Containment technologies required to protect receptors and the environment from release of asbestos fibers during implementation.	$$$$$	⓿	Retained	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with contaminated soils removal and transport technologies.

Table 4-2 (continued)
Screening of Potentially Applicable Remedial Technologies/Process Options Based on Effectiveness, Implementability, and Relative Cost
Contaminated Soils

Notes:

1. The screening process for effectiveness, implmenetability, and relative cost involves a qualitative assessment of the degree to which process options address evaluation criteria presented in Section 4.6. The numerical designations for the qualitative ratings system used in this table are not used to quantitatively assess process options (for instance, rankings for a process option are not additive).
2. Shading indicates remedial technologies/process options have been eliminated from further consideration based on lack of effectiveness, implementability, and/or cost. Remaining (unshaded) remedial technologies/process options have been retained for assembly into remedial action alternatives as discussed in Section 5.0.

Legend for Qualitative Ratings System: The following ratings were used for evaluation and presentation of effectiveness, implementability, and relative cost:

Effectiveness and Implementability		Relative Cost	
⓿	**None**	⓿	**None**
❶	**Low**	$	**Low**
❷	**Low to Moderate**	$$	**Low to Moderate**
❸	**Moderate**	$$$	**Moderate**
❹	**Moderate to High**	$$$$	**Moderate to High**
❺	**High**	$$$$$	**High**

Table 4-3
Retained Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
No Action	None	None	No action would be taken. Contaminated soils would remain in their existing conditions.	Required by NCP as stand-alone alternative.
Monitoring	Inspection	Non-Intrusive Visual Inspection	A non-intrusive (surficial) visual inspection of the immediate ground surface to determine the presence or absence of asbestos containing soils.	Viable for short- and long-term site monitoring.
		Intrusive Visual Inspection	An intrusive visual inspection of the subsurface (using excavations or boreholes) to determine the presence or absence of asbestos containing soils.	Viable for short- and long-term site monitoring.
	Sampling and Analysis	Sample Collection and Microscopic Analysis	Air and/or soil samples would be collected for microscopic analysis in a laboratory to determine the potential presence of asbestos fibers. Types of samples collected include but are not limited to soil, ambient air, and ABS. Types of microscopic analyses include but are not limited to PLM, stereomicroscopy, and TEM.	Viable for short- and long-term site monitoring.
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices	Contact with contaminated soils would be controlled through legal instruments. Examples of governmental (state or local) controls include but are not limited to zoning restrictions, ordinances, statutes, codes or regulations, building permits, or other provisions that restrict land or resource use at a site. Examples of proprietary controls include but are not limited to instruments such as easements and covenants; incase the city of Libby decides to transfer the property to a private ownership. Examples of informational devices (ensure the overall reliability of other controls) include but are not limited to state registries of contaminated properties, deed notices, and advisories.	Potentially viable process option for combination with engineered controls or contaminated soils containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.
	Community Awareness	Information and Education Programs	Community information and education programs would be undertaken to enhance awareness of potential hazards and remedies for contaminated soils.	Potentially viable process option for combination with all other technologies.
Engineered Controls	Access Restrictions	Fencing and Posted Warnings	Contaminated soils would be enclosed by fences and warning signs to control access by human receptors and some ecological receptors.	Potentially viable process option for combination with institutional controls or contaminated soils containment and/or disposal technologies in which wastes posing a threat to receptors are left on site.

Table 4-3 (continued)
Retained Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	Remedial Technology	Process Option	Description of Option	Process Option Viability with Respect to Assembly of Remedial Alternatives
Containment	Surface Source Controls – Continued	Water-Based Suppression	Contaminated soils would be kept "adequately wet" using water or a water-based dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soils removal, disposal, and/or treatment technologies.
		Chemical-Based Suppression	Contaminated soils would be treated with a resinous or petroleum-based chemical dust suppressant to control airborne migration of asbestos fibers from contaminated soils to the surrounding environment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soils removal, disposal, and/or treatment technologies.
		Soil or Rock Exposure Barrier/Cover	Contaminated soils would be covered with a layer of clean soil or rock with sufficient thickness to eliminate exposure risks to receptors.	Viable as a long-term solution.
		Asphalt or Concrete Exposure Barrier/Cover	Contaminated soils would be covered with layers of asphalt or concrete with sufficient thickness to eliminate exposure risks to receptors.	Viable as a long-term solution.
		Geosynthetic Multi-Layer Exposure Barrier/Cover	Contaminated soils would be covered with geosynthetic material (such as geomembrane or a GCL) along with protective vegetative or rock layers to eliminate exposure risks to receptors.	Viable as a long-term solution.
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)	Contaminated soils would be removed using mechanical excavation methods.	Viable as a long-term solution; must be combined with contaminated soils transport, disposal, and/or treatment technologies.
	Transport	Mechanical Transport (Hauling/Conveying)	Contaminated soils would be transported by truck or other mechanical conveyance method.	Viable as a long-term solution; must be combined with contaminated soils removal, disposal, and/or treatment technologies.
		Pneumatic Transport (Vacuum Truck/ Pumping)	Contaminated soils would be transported using vacuum hoses, vacuum trucks, or other pneumatic conveyance system.	Viable as a long-term solution; must be combined with contaminated soils removal, disposal, and/or treatment technologies.
	Disposal	Offsite Disposal	Removed contaminated soils would be disposed of at the Former Libby Asbestos Vermiculite Mine.	Viable as a long-term solution; must be combined with contaminated soils removal and transport technologies.

Table 4-3 (continued)
Retained Remedial Technologies/Process Options
Contaminated Soils

General Response Actions	*Remedial Technology*	*Process Option*	*Description of Option*	*Process Option Viability with Respect to Assembly of Remedial Alternatives*
Treatment	Chemical/Physical Treatment	Physical Separation/ Segregation	Vermiculite would be separated and segregated from the associated soil medium for disposal and/or treatment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with other contaminated soils treatment technologies.
		Size Reduction	Vermiculite would be reduced in size using approved techniques to facilitate disposal and/or treatment.	Not viable as a long-term solution; however, it is a potentially viable process option for combination with contaminated soils containment, disposal, and/or treatment technologies.
	Thermal/Chemical Treatment	Thermo-chemical Treatment	Contaminated soils would be mixed with proprietary demineralizing agents within a hydrofluoric acid solution. The mixture is then heated in a rotary hearth furnace. This process is similar to vitrification but does not involve complete melting. Instead, the process results in partial sintering of the material. The resulting reaction product (rock-like material) is an inert waste. TCCT, patented by ARI is a commercial form of this technology.	Viable as a long-term solution and meets NCP preference for innovative and demonstrated treatment technologies. Must be combined with contaminated soils removal and transport technologies.

Note:

Remaining (unshaded) remedial technologies/process options have been retained for assembly into remedial action alternatives.

Table 5-1

Remedial Technologies/Process Options Evaluated for Assembly Into Remedial Alternatives

General Response Actions	Remedial Technology	Process Option	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
No Action	None	None	✓				
Monitoring	Inspection	Non-Intrusive Visual Inspection	✓	✓	✓	✓	✓
		Intrusive Visual Inspection		✓	✓	✓	✓
	Sampling and Analysis	Sample Collection and Microscopic Analysis		✓	✓	✓	✓
Institutional Controls	Land Use Controls	Governmental Controls, Proprietary Controls, and Informational Devices		✓	✓	✓	✓
	Community Awareness	Information and Education Programs		✓	✓	✓	✓
Engineered Controls	Access Restrictions	Fencing and Posted Warnings		✓			
Containment	Surface Source Controls	Water-Based Suppression			✓	✓	✓
		Chemical-Based Suppression			✓	✓	✓
		Soil or Rock Exposure Barrier/Cover			✓		
		Asphalt or Concrete Exposure Barrier/Cover			✓		
		Geosynthetic Multi-Layer Exposure Barrier/Cover			✓		
Removal, Transport, Disposal	Removal	Mechanical Removal (Excavation)				✓	✓
	Transport	Mechanical Transport (Hauling/Conveying)				✓	✓
		Pneumatic Transport (Vacuum Truck/ Pumping)				✓	✓
	Disposal	Offsite Disposal				✓	
Treatment	Thermal/Chemical Treatment	Thermo-chemical Treatment					✓

Table 5-1 (continued)
Remedial Technologies/Process Options Evaluated for Assembly Into Remedial Alternatives

Notes:

1. Check mark designations indicate that remedial technology/process option could be evaluated as a potential component of the indicated remedial alternative.
2. Shaded boxes indicate the process options are not considered for the remedial alternative(s) in question.
3. Where similar process options have been indicated for the same remedial alternative (such as mechanical transport versus pneumatic transport), the most representative process has been selected for evaluation and costing. However that does not preclude use of the similar alternate processes during implementation of the selected remedy.
4. Descriptions of remedial technologies/process options are provided in Table 4-3. Descriptions of remedial alternatives are provided in Section 5.3.

Alternative 1: No Action

Alternative 2: Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring

Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Alternative 5: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

Figures

Legend

- OU1 - Former Export Plant
- OU2 - Former Screening Plant, Flyway Property, Highway 37 right-of-way adjacent to the Screeing Plant, and the KDC Bluffs
- OU3 - Mine site area, Kootenai River, Rainy Creek and Rainy Creek Road
- OU4 - Residential, Commercial, Industrial Properties including Schools and Parks
- OU5 - Former Stimson Lumber Mill
- OU6 - BNSF Railyard, Tracks, and Right -of-way

N

0 5,000 10,000 15,000 20,000

Feet

1 inch equals 8,000 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
See Note on Map

May 2008

This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of May 2008.

Aerial Phota Data Sources

Libby Color Image Source:
CDM 2002
Flight Dates: 10/14/02 to 10/18/02
Aerials flown by Visual Intelligence Systems, Inc.
1505 Highway 6 South
Houston, TX 77077

Gray Scale DOQ Source:
U.S. Geological Survey Digital Orthophoto Quarter-Quadrangles (DOQQ) 28-Jul-95
Seamless Download (http://seamless.usgs.gov/website/seamless/)
EROS Data Center
USGS EROS Data Center
47914 252nd Street
Sioux Falls
South Dakota
57198-0001

Troy Color Image Source:
National Agriculture Imagery Program (NAIP) 2005
Sales Section
USDA Farm Service Agency
Aerial Photography Field Office
2222 West 2300 South
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Operable Unit (OU) Boundaries Libby Asbestos Site Libby, Montanta

Figure 1-1

CDM

Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure1-1_FS_OUMap_11x17size.mxd

Legend

OU 1 Boundary

N

0 500 1,000 1,500 2,000

Feet

1 inch equals 1,250 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of May 2008.

Operable Unit 1 Site Location Map

Figure 1-2

CDM

Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure1-2_OU1_FS_SiteLocation.mxd

Legend

- Area 1 - Former Export Plant
- Area 2 - Riverside Park
- Area of Concern - U.S. Highway 37 Right-of-Way
- OU 1 Boundary

N

0 200 400

Feet

1 inch equals 250 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

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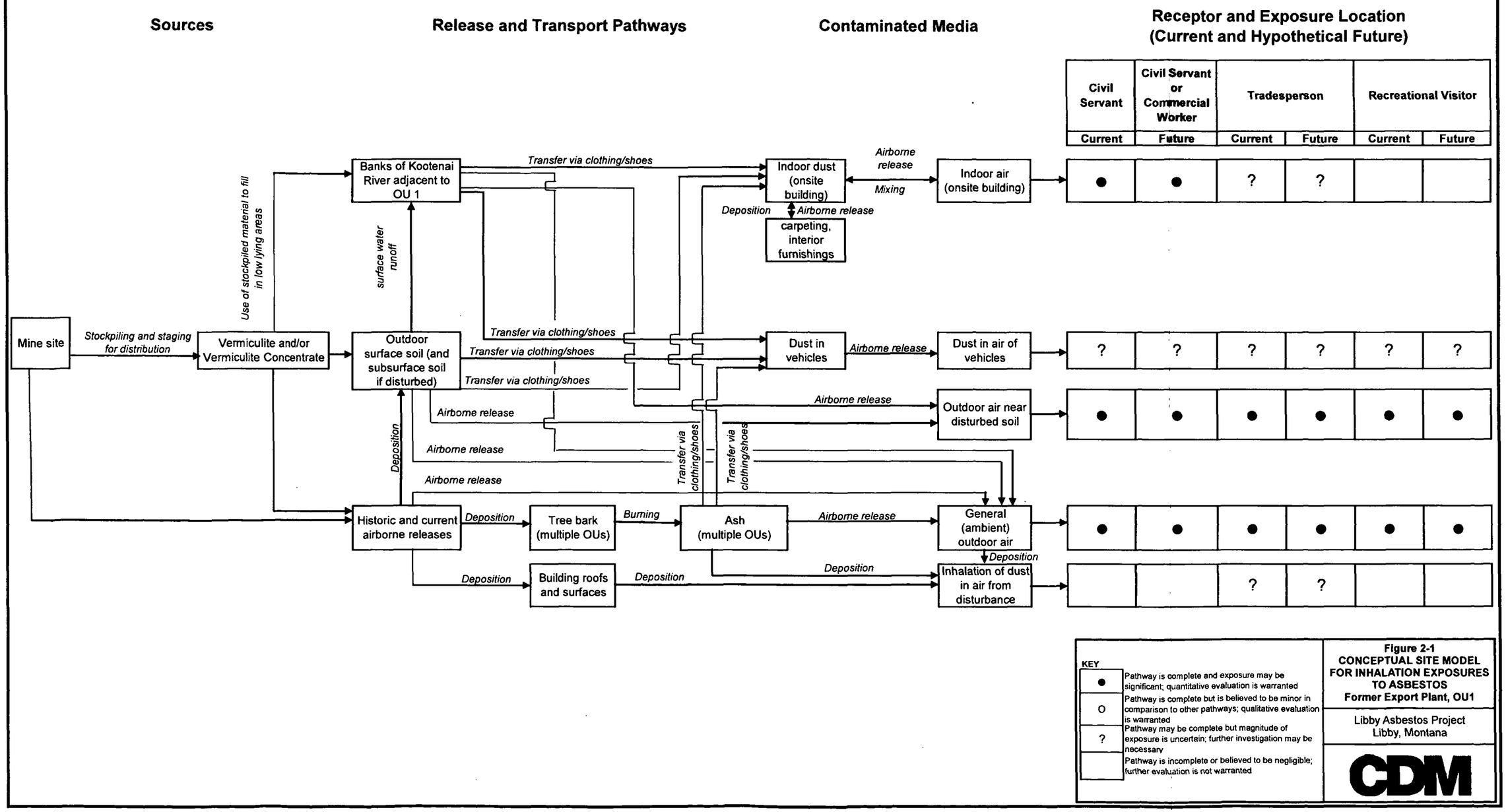
Operable Unit 1
Site Map

Figure 1-3

CDM

Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure1-3_OU1_FS_SiteDetail.mxd



Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure2-1_ConceptualSiteModel.mxd

Legend

Residual Contamination Based on Investigation Activities and Confirmation Soil Sampling

- ND for LA
- < 1% LA
- Operable Unit 1 Boundary
- Area 1 - Former Export Plant
- Area 2 - Riverside Park

N

0 100 200 300

Feet

1 inch equals 125 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

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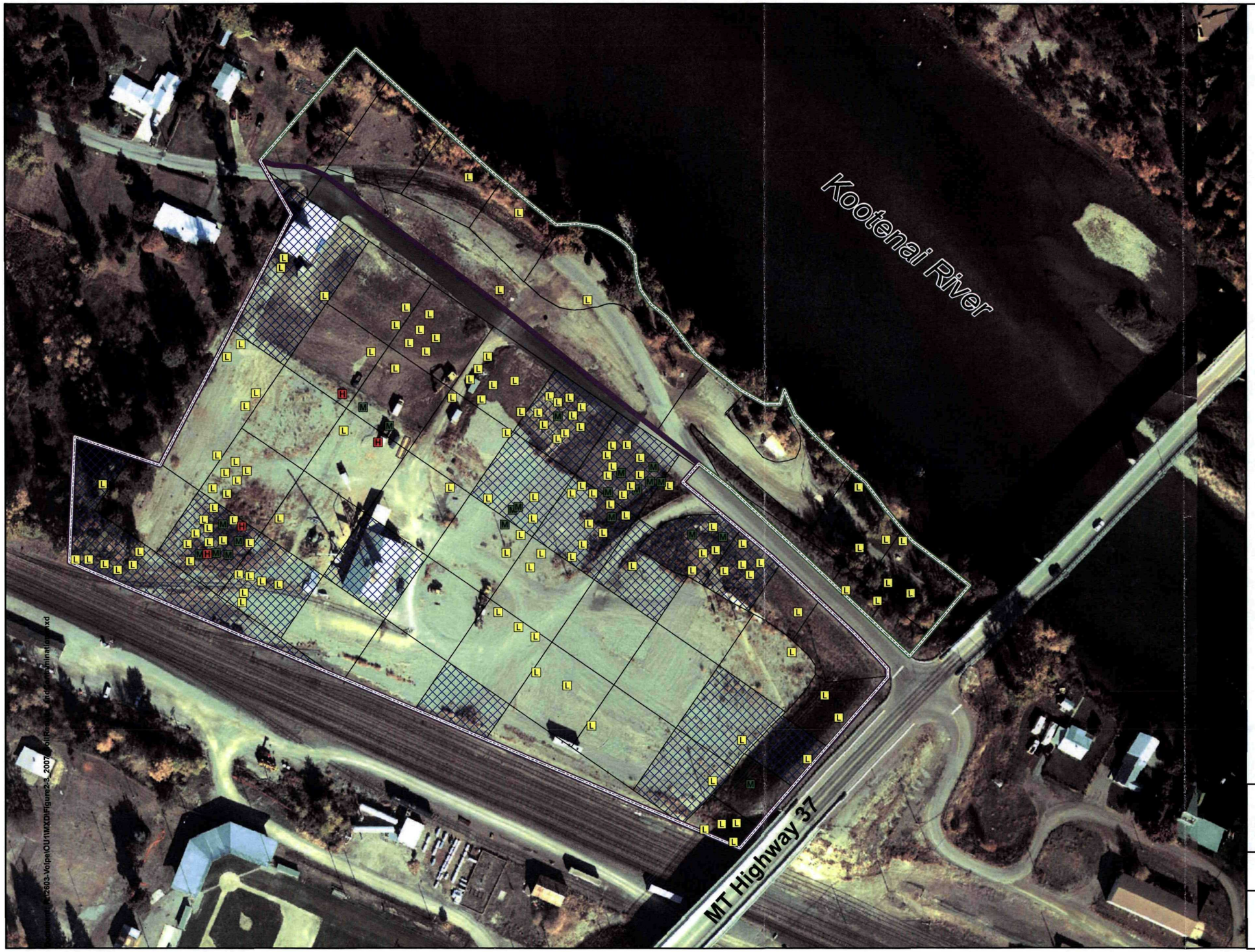
Operable Unit 1
2007 Residual Contamination

Figure 2-2

CDM

Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure2-2_ConfirmationSoilSampling.mxd



Legend

Visible Vermiculite

PLM-VE Sampling Result

- L — Low Levels of Visual Vermiculite
- M — Medium Levels of Visual Vermiculite
- H — High Levels of Visual Vermiculite
- Trace
- Sampling Grid
- Operable Unit 1 Boundary
- Area 1 - Former Export Plant
- Area 2 - Riverside Park

N

0 100 200 300

Feet

1 inch equals 125 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

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Operable Unit 1
2007 Soil Investigation Results

Figure 2-3

CDM

\\2603-Volpe\OU1\MXD\Figure2-3_2007_SoilResults_andContamination.mxd

Analysis by R. Farmer; Analysis Date: 05-05-2008; Plot Date: 05-09-2008; File Name: \2603-Volpe\OU1\MXD\Figure2-3_2007_SoilResults_andContamination.mxd

Legend

- Clean Soil Cover
- Operable Unit 1 Boundary
- Area 1 - Former Export Plant
- Area 2 - Riverside Park

N

0 100 200 300

Feet

1 inch equals 125 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

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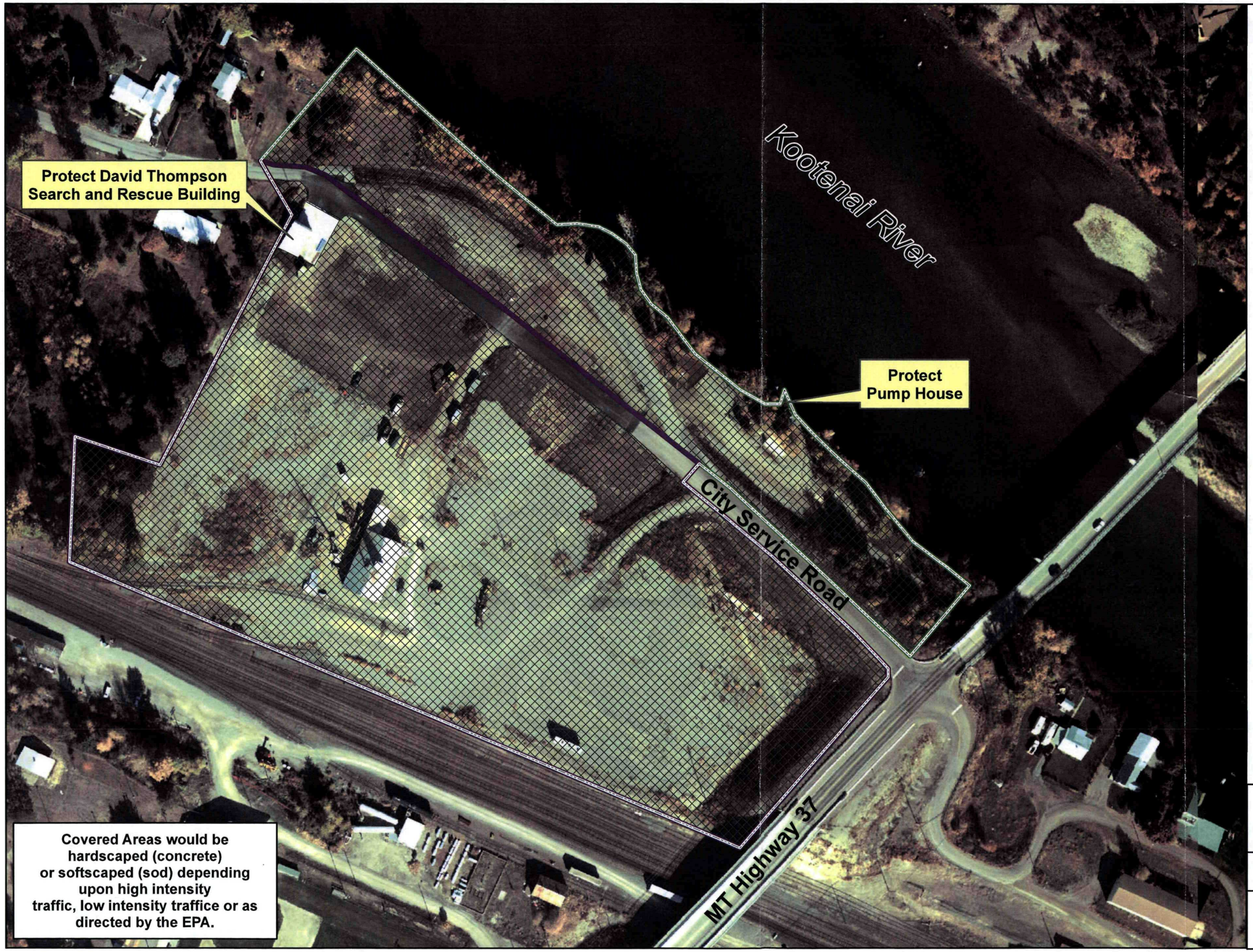
Operable Unit 1
Alternative 3
Conceptual Remedial Configuration

Figure 7-1

CDM

Analysis by R. Farmer; Analysis Date: 05-16-2008; Plot Date: 05-16-2008; File Name: \2603-Volpe\OU1\MXD\Figure7-1_Alt3_ConceptualRemedialConfig.mxd



Legend

- Excavation/Backfill Area
- Operable Unit 1 Boundary
- Area 1 - Former Export Plant
- Area 2 - Riverside Park

N

0 100 200 300

Feet

1 inch equals 125 feet

Geographic Data Standards:
Projected Coordinate System:
NAD 1983 State Plane Montana FIPS

Data Source(s):
2002 Aerial Photo

May 2008

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The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of May 2008.

Operable Unit 1
Alternative 4
Conceptual Remedial Configuration

Figure 7-2

CDM

Analysis by R. Farmer; Analysis Date: 05-16-2008; Plot Date: 05-16-2008; File Name: \2603-Volpe\OU1\MXD\Figure7-2_Alt4_ConceptualRemedialConfig.mxd

Appendix A

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)

Summary of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) Compliance OU1 - Former Export Plant Site, Libby

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
National Historic Preservation Act (NHPA), 16 U.S.C. § 470 40 CFR 6.301(b) 36 CFR 60, 63, 800	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places.	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and if so how the effect may be minimized or mitigated. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit, and any archaeological investigations at a site must be conducted by a professional archaeologist. If any remedial action activities are necessary beyond permitted, SHPO consultation and NHPA compliance will be addressed during remedial design.		✓	
Archaeological and Historic Preservation Act 16 U.S.C. § 469 40 CFR 6.301(c) 43 CFR 7	Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.			✓	
Fish and Wildlife Coordination Act 16 U.S.C. §§ 661, et seq., 40 CFR 6.302(g) 50 CFR 83 33 CFR 320-330	Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	If the remedial action involves activities that affect wildlife and/or non-game fish, federal agencies must first consult with the U.S. Fish and Wildlife Service and the relevant state agency with jurisdiction over wildlife resources.		✓	
Endangered Species Act, 16 U.S.C. § 1531 40 CFR 6.302(h) 50 CFR 17 and 402	Relevant and Appropriate	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. Endangered Species Act, Section 7 requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the remedial areas, activities must be designed to conserve the species and their habitat. To date no threatened or endangered species have been identified in the area of the site.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
Migratory Bird Treaty Act, 16 U.S.C. §§ 703, et seq. 50 CFR 10.13	Relevant and Appropriate	This requirement establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the U.S. Fish and Wildlife Service during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	The selected remedial actions will be carried out in a manner to avoid adversely affecting migratory bird species, bald eagle and including individual birds or their nests.		✓	
Clean Air Act (CAA) 42 U.S.C. § 7401, et seq. 40 CFR 61, Subpart M (delegated to the state and incorporated by reference at ARM 17.8.341)	Applicable	National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Asbestos	The selected remedial actions will be carried out in a manner that will comply with all the National Emission Standard for Asbestos as required under NESHAP.	✓		✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.152 Note: Section 61.152(b)(3) is not delegated to the State	Relevant and Appropriate	This requirement establishes detailed specifications for air cleaning used as part of a system to control asbestos emissions control system.	These requirements would be applicable if air cleaning is part of the building demolitions. It would be relevant and appropriate to other air cleaning operations.	✓		✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.155	Relevant and Appropriate	This requirement establishes detailed standards for operations that convert asbestos containing waste material into non-asbestos (asbestos-free) material.	These requirements would be applicable if the remedial action includes any treatment of asbestos containing material.	✓		✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.145 (c) & (d)	Relevant and Appropriate	This requirement establishes detailed standards and specifications for demolition and renovation. The regulation provides detailed procedures for controlling asbestos release during demolition of a building containing "regulated-asbestos containing material (RACM)".	Applicable to building demolitions that will occur as part of the removal if certain threshold volumes of RACM are disturbed. The dust control portions of the regulations are relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.149 Note: Section 61.149(c)(2) is not delegated to the State	Relevant and Appropriate	This Act and implementing regulations, 40 CFR 61.149, establish detailed procedures and specifications for handling and disposal of asbestos containing waste material generated by an asbestos mill.	Requirements under this regulation are considered relevant and appropriate to the ACM disposal. It is not applicable because the facilities do not meet the regulatory definition of an asbestos mill.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
Federal ARARs						
Clean Air Act (CAA) Air Cleaning 40 CFR 61.150 Note: Section 61.150(a)(4) is not delegated to the State	Relevant and Appropriate	Standard for waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations. This regulation provides detailed procedures for processing, handling and transporting asbestos containing waste material generated during building demolition and renovation (among other sources).	Applicable to RACM generated by building demolitions that will occur as part of the remedial action. Relevant and appropriate for soil disturbance activities and for asbestos contaminated material that does not meet the strict definition of RACM.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.151 Note: Section 61.151(c) is not delegated to the State	Relevant and Appropriate	Standard for inactive waste disposal sites for asbestos mills and manufacturing and fabricating operations. Provides requirements for covering, revegetation and signage at facilities where RACM will be left in place.	Requirements under this regulation are considered relevant and appropriate to asbestos containing soils and/or debris left in place. It is not applicable because the facilities that are part of this remedial do not meet the facility definitions in the regulation.			✓
Clean Air Act (CAA) Air Cleaning 40 CFR 61.154 Note: Section 61.154(d) is not delegated to the State	Other Requirements	Standard for active waste disposal sites. Provides requirements for off-site disposal sites receiving asbestos-containing waste material from building demolitions and other specific sources.				✓
Toxic Substances Control Act (TSCA) 40 CFR Part 763, Subpart G (implemented by the State under the Montana Asbestos Control Act)	Other Requirements	Asbestos abatement projects and asbestos worker protection. This subpart protects certain State and local government employees who are not protected by the Asbestos Standards of the Occupational Safety and Health Administration (OSHA). This subpart applies the OSHA Asbestos Standards in 29 CFR 1910.1001 and 29 CFR 1926.1101 to these employees.	The State requires that work be performed in accordance with 40 CFR 763.120 and 763.121 (asbestos abatement projects) and 29 CFR 1926.58 (asbestos standard for the construction industry). These requirements will be incorporated into the health & safety plan but do not meet the definition of an ARAR.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Asbestos Control Act ARM 17.8.204 ARM 17.8.206	Relevant and Appropriate	Ambient Air Monitoring & Ambient Air Methods and Data: Require that all ambient air monitoring, sampling and data collection, recording, analysis and transmittal shall be in compliance with the Montana Quality Assurance Manual except when more stringent requirements are determined to be necessary.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓		
Montana Asbestos Control Act ARM 17.8.220 ARM 17.8.223	Applicable	Ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. Ambient air quality standards for PM-10. PM-10 concentrations in the ambient air shall not exceed the following standards: 150 micrograms/cubic meter of air, 24-hour average; and 50 micrograms/cubic meter of air, expected annual average.	The removal action will involve significant soil disturbance. Particulate/dust levels will need to be controlled. Each of the ambient air quality standards includes specific requirements and methodologies for monitoring and detection. These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓		✓
Montana Asbestos Control Act ARM 17.8.304	Applicable	Visible Air Contaminants. No source may discharge emissions into the atmosphere that exhibit opacity of 20 percent or greater, averaged over six consecutive minutes. This standard is limited to point sources, but excludes wood waste burners, incinerators, and motor vehicles.	No visible emissions are anticipated.	✓		✓
Montana Asbestos Control Act ARM 17.8.308	Applicable	Airborne Particulate Matter. Emissions of airborne particulate matter from any stationary source shall not exhibit opacity of 20 percent or greater, averaged over six consecutive minutes.	This standard applies to the production, handling, transportation, or storage of any material; to the use of streets, roads, or parking lots; and to construction or demolition projects.	✓		✓
Montana Asbestos Control Act ARM 17.8.315	Relevant and Appropriate	Odors. If a business or other activity will create odors, those odors must be controlled, and no business or activity may cause a public nuisance.	Action is not expected to produce nuisance level odors.	✓		

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Water Quality Control Act ARM 17.30.637	Applicable	It states that no waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards; provided a short term exemption from a surface water quality standard may be authorized by the department for "emergency remediation activities" under the conditions specified in § 75-5-308, MCA.		✓		
Montana Water Quality Control Act ARM 17.30.705	Applicable	Requires that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.708.		✓		
Montana Asbestos Control Act ARM 17.74.301 et seq., MCA 75-2-501 et seq.	Applicable	The Montana Asbestos Control Act, and implementing rules establish standards and procedures for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.	The Montana Asbestos Control Act, and implementing rules establish standards and procedures for accreditation of asbestos-related occupations and control of the work performed by persons in asbestos-related occupations.			✓
Montana Asbestos Control Act ARM 17.74.308	Applicable	Establishes air monitoring requirements for asbestos abatement projects, including for building clearance after abatement.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.			✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Asbestos Control Act ARM 17.74.335	Applicable	Asbestos abatement project permits. Asbestos abatement projects require a permit from DEQ. The permit conditions include but are not limited to: (a). A requirement that all work performed be in accordance with 29 CFR Section 1926.58 (asbestos standards for the construction industry); and 40 CFR Section 763.120, 121 (requirements for asbestos abatement projects); (b). A requirement that all asbestos be properly disposed in an approved asbestos disposal facility. "Approved asbestos disposal facility" is defined at ARM 17.54.302(1) as a properly operated and licensed class II landfill as described in ARM 17.50.504; (c). A requirement that asbestos be disposed in accordance with 40 CFR Part 61, Subpart M (National Emission Standard for Asbestos). See discussion above on National Emission Standard for Asbestos.	Applicable to work meeting the definition of RACM. Relevant and Appropriate for soils or contaminated material that does not meet the strict definition of RACM. The substantive requirements for performance of the work and proper disposal and will be met by the contractors used. On-site CERCLA actions do not require a permit.			✓
Montana Asbestos Control Act ARM 17.74.351 ARM 17.74.365	Applicable	Adopts and incorporates by reference 40 CFR subparts A and M (NESHAP) for asbestos, and the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods for detecting asbestos by phase contrast microscopy (PCM) and a description of the 7402 Analytical Method for detecting asbestos by transmission electron microscopy (TEM). It requires that training for asbestos workers, supervisors, inspectors, project management planners, and project designers meet requirements of 40 CFR 763, subpart E, Appendix C (Asbestos Model Accreditation Plan).		✓		✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
The Montana Asbestos Control Manual	Applicable	The Montana Asbestos Control Manual (the Manual) is adopted and incorporated by reference in ARM Title 17, Chapter 74, Subchapter 3. The Manual identifies practices and procedures for inspecting for asbestos, conducting asbestos projects, and clearing asbestos projects. The Montana Department of Environmental Quality administers NESHAP through its asbestos control program. The NESHAP contains standards that regulate building demolitions, renovations, asbestos disposal sites, and other sources of asbestos emissions.		✓		✓
The Natural Streambed and Land Preservation Act of 1975 ARM 36.2.410 et seq., MCA 75-7-101 et seq.	Relevant and Appropriate	Establishes minimum standards if a project alters or affects a streambed, including any channel change, new diversion, riprap or other streambank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development.	The removal actions may require streambank protection. If so, the substantive portions of these requirements would be applicable.			✓
Montana Code Annotated (MCA), Montana Floodplain and Floodway Management Act and Regulations , ARM 36.15.601 et seq. MCA 76-5-401 et seq.	Relevant and Appropriate	The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway and floodplain. Libby OU1 is adjacent to the Kootenai River, and these standards are relevant to all actions within the floodplain.	According to the National Flood Insurance Program, Floodway Boundary and Floodway Map, the Former Export Plant property is outside the 100 year flood plain. The Screening Plant, which is at a higher elevation is also presumed to be outside the 100 year flood plain. No solid waste disposal will occur within the floodway or floodplain.		✓	
Floodplain and Floodway Management Act ARM 36.15.602(5), ARM 36.15.605, ARM 36.15.703	Relevant and Appropriate	Solid and hazardous waste disposal and storage of toxic, flammable, hazardous or explosive materials are prohibited anywhere in floodways or floodplains.				

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Floodplain and Floodway Management Act ARM 36.15.701 ARM 36.15.702(2)	Relevant and Appropriate	In the flood fringe (i.e., within the floodplain but outside the floodway), residential, commercial, industrial, and other structures may be permitted subject to certain conditions relating to placement of fill, roads, and flood proofing. Standards for residential, commercial or industrial structures are found in ARM 36.15.702(2)				
Montana Code Annotated (MCA), Montana Antiquities Act, MCA 22-3-421, et seq.	Relevant and Appropriate	Montana Antiquities Act addresses the responsibilities of State agencies regarding historic and prehistoric sites including buildings, structures, paleontological sites, archaeological sites on state owned lands. Each State agency is responsible for establishing rules regarding historic resources under their jurisdiction which address National Register eligibility, appropriate permitting procedures and other historic preservation goals. The State Historic Preservation Office maintains information related to the responsibilities of State Agencies under the Antiquities Act.			✓	
Montana Code Annotated (MCA), Montana Human Skeletal Remains and Burial Site Protection Act (1991), MCA 22-3-801 et seq.	Applicable	The Human Skeletal Remains and Burial Site Protection Act is the result of years of work by Montana Tribes, State agencies and organizations interested in ensuring that all graves within the State of Montana are adequately protected. If human skeletal remains or burial sites are encountered during remedial activities within OU1 of the Libby Asbestos Site, then these requirements will be applicable.			✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Code Annotated (MCA) MCA 50-64-104 MCA 50-64-104 (7)	Applicable	This section provides for various safeguards to prevent release of asbestos into the air during demolition. The prescribed safeguards include notification of the local fire department, posting of warning signs, wetting of surfaces, dust emission control, covering and wetting during transport, and depositing where materials are unlikely to be disturbed. Requires prevention of asbestos dust dispersion during transportation by requiring debris to be covered, enclosed and wetted.	These standards are applicable to building demolition and relevant and appropriate to other removal activities.			✓
Montana Code Annotated (MCA), Local Air Pollution Control Program MCA 75-3-301	Applicable	The provisions of the Lincoln County Air Pollution Control Program, approved by Montana DEQ pursuant to § 75-2-301, MCA and administered by Lincoln County, are designed to regulate activities within a designated Air Pollution Control District to achieve and maintain such levels of air quality as will protect human health and safety and, to the greatest degree practicable, prevent injury to plant and animal life and property, and facilitate the enjoyment of the natural attractions of Lincoln County.			✓	✓
Montana Code Annotated (MCA) MCA 75-5-605	Applicable	Prohibits the causing of pollution of any state waters. Section 75-5-103(21)(a)(i) defines pollution as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards. States that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Any permitted placement of waste is not placement if the agency's permitting authority contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.	These requirements would be triggered only in the event that the removal action impacts surface of groundwater. Excavation may take place close to the Kootenai River. Precautions will need to be put into place to prevent accidental release of asbestos containing soils into the river. May also be applicable if disposal of RACM occurs on-site.		✓	

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Montana Code Annotated (MCA) MCA 87-5-502 and 504	Applicable	Provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in approving remedial actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, MCA § 75-7-101, et seq., (Applicable -- substantive provisions only) includes similar requirements and is applicable to private parties as well as government agencies.	Consultation with the Montana Department of Fish, Wildlife and Parks, and any conservation district or board of county commissioners (or consolidated city/county government) is encouraged during the designing and implementing of the remedial action for OU1 of the Libby Asbestos Site.		✓	
Occupational Health Act ARM 17.74.101 ARM 17.74.102 MCA 50-70-101 et seq.,	Other Requirements	ARM §17.74.101, along with the similar Federal standard in 29 CFR §1910.95, addresses occupational noise. ARM § 17.74.102, along with the similar federal standard in 29 CFR §1910.1000 addresses occupational air contaminants.	These requirements will be addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.			✓
Montana Safety Act. Montana Code Annotated (MCA) MCA 50-71-201, 202 and 203	Other Requirements	These provisions state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.				✓

Statue and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
State of Montana ARARs						
Employee and Community Hazardous Chemical Information Act MCA 50-78-201, MCA 50-78-202, MCA 50-78-204	Other Requirements	State that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.	These requirements **will be** addressed as part of the Health & Safety Plan and do not meet the definition of an ARAR.			✓

Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
BMP	Best Management Practices
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
MCA	Montana Code Annotated
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NCRS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
RACM	Regulated Asbestos Containing Material
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Office
TSCA	Toxic Substances Control Act
U.S.C	United States Code

Appendix B

Alternative Quantity Calculations

Alternative Screening

Table B-1

Alternative 2	
Total Length to be Fenced	**Area (FT)**
Total Perimeter Length - Area 1	3,140
Total Perimeter Length - Area 2	2,560
Total Perimeter Length	**5,700**

Table B-2

Alternative 3			
Total Area to be Covered	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Total Surface Area - Area 1	448,000	49,778	10.30
Total Surface Area - Area 2	146,000	16,222	3.40
Total Surface Area to be Covered - OU1	**594,000**	**66,000**	**13.70**
In-Place Containment/Cover	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Total Common Backfill Required:	573,000	21,222	24,406
Total Topsoil Required:	191,000	7,074	8,135
Total Soil Required:	**764,000**	**28,296**	**32,541**

Table B-3

Alternative 4			
Total Area to be Excavated	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Total Surface Area - Area 1	448,000	49,778	10.30
Total Surface Area - Area 2	146,000	16,222	3.40
Total	**594,000**	**66,000**	**13.70**
Excavated Area/Full Site	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Total Common Backfill Required:	286,500	10,611	12,300
Total Topsoil Required:	191,000	7,074	8,150
Total Volume of Excavated Soil:	**573,000**	**21,222**	**25,000**

Table B-4

Alternative 5			
Total Area to be Excavated	**Area (SF)**	**Area (SY)**	**Area (ACR)**
Total Surface Area - Area 1	448,000	49,778	10.30
Total Surface Area - Area 2	146,000	16,222	3.40
Total	**594,000**	**66,000**	**13.70**
Excavated Area/Full Site	**Volume (BCF)**	**Volume (BCY)**	**Volume (LCY)**
Total Common Backfill Required:	286,500	10,611	12,300
Total Topsoil Required:	191,000	7,074	8,150
Total Volume of Excavated Soil:	**573,000**	**21,222**	**25,000**
Total Weight of Excavated Soil:	**1.21 TN/CY**		**30,300**

Detailed Analysis of Alternatives

Alternative 3
Calculation Worksheet
Required Materials Input Calculations

Site:	OU1 - Former Export Plant	**Prepared By:** AS	**Date:** 5/12/2008
Location:	Libby, Montana		
Phase:	Draft Feasibility Study	**Checked By:** AL	**Date:** 5/12/2008
Base Year:	2008		

Work Statement:
The spreadsheet also allow the user to change the quantities of earthwork, road building, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities of soils, cover construction and reclamation and the resulting capital costs.

Total Area to be Covered	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area - Area 1	448,000	49,778	10.30
Total Surface Area - Area 2	146,000	16,222	3.40
Total Surface Area to be Covered - OU1	594,000	66,000	13.70

Hardscape and Softscape Cover	Area (SF)	Area (SY)	Area (ACR)
Asphalt Pavement - City Service Road (within OU1 boundary)	21,000	2,333	0.50
Softscape - Sod (Assume 2/3rd of total area)	382,000	42,444	8.80
Hardscape - Concrete (Assume 1/3rd of total area)	191,000	21,222	4.40

Asphalt Pavement	Area (SF)	Area (SY)	Area (ACR)
Asphalt Pavement - City Service Road (outside OU1 boundary)	12,000	1,333	1

Softscape Ratio	2/3
Hardscape Ratio	1/3
Expansion Factor	1.15
Cover - CY/Day	500

Cover System	Feet
Thickness of Subsoil	1.0
Thickness of Topsoil	0.5

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (inches)
Gravel Laydown Area	50	50	6.0
Gravel Road Base - Temporary Access Road	1,000	15	6.0

Assumed Onsite Riprap Protection	Width (FT)	Length (FT)	Area (SF)
Riprap Protection (Assumed)	20	1,000	
Riprap Sectional Area (20' x 2.5')			50.0

In-Place Containment/Cover	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Soil Required:	764,000	28,296	32,541
Total Common Backfill Required:	573,000	21,222	24,406
Total Topsoil Required:	191,000	7,074	8,135

	SF	Acre
Clearing and Grubbing	45,100	2

Estimated Duration of the Project		
Number of Years to Complete:	0.4	years
Number of Months (April 1 to Nov 30):	2.6	months
4 Days off per month in 30 days months:	26	per month
Number of working days (500 cy/day)	66	days
Total number of working days	66	days

Number Borrow Area Samples (1/10,000 CY)
4

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

Alternative 3
Calculation Worksheet
Required Materials Output Calculations

Site:	OU1 - Former Export Plant	**Prepared By:** AS	**Date:** 5/12/2008
Location:	Libby, Montana		
Phase:	Draft Feasibility Study	**Checked By:** AL	**Date:** 5/12/2008
Base Year:	2008		

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for cover construction, access road and other material. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils cover construction, reclamation and the resulting capital costs.

Output Fields-Required Materials

Remedy Components	Sod (SF)
In-Place Containment/Cover	382,000
TOTALS:	**382,000**

Assumed Onsite Riprap Protection	Area (SY)	Volume (CY)	Volume (LCY)
Riprap Protection (Assumed)	2,222	1,852	2,130

Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Laydown Area	278	46	53	77
Gravel Road Base - Temporary Access Road	1,667	300	345	500

TABLE B-6

Alternative 4
Calculation Worksheet
Required Materials Input Calculations

Site:	OU1 - Former Export Plant	**Prepared By:** AS	**Date:** 5/13/2008
Location:	Libby, Montana		
Phase:	Draft Feasibility Study	**Checked By:** AL	**Date:** 5/14/2008
Base Year:	2008		

Work Statement:
The spreadsheet also allow the user to change the quantities of earthwork, road building, and period of construction. Changes to the input fields on this calculation sheet will also change the quantities of soils, backfill construction and reclamation and the resulting capital costs.

Total Area to be Excavated	Area (SF)	Area (SY)	Area (ACR)
Total Surface Area - Area 1	448,000	49,778	10.30
Total Surface Area - Area 2	146,000	16,222	3.40
Total	**594,000**	**66,000**	**13.70**

Total Volume to be Excavated	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Surface Area - Area 1	427,000	15,815	18,188
Total Surface Area - Area 2	146,000	5,407	6,219
Total	**573,000**	**21,222**	**24,406**

Hardscape and Softscape Cover	Area (SF)	Area (SY)	Area (ACR)
Asphalt Pavement - City Service Road	21,000	2,333	0.50
Softscape - Sod (Assume 2/3rd of total area)	382,000	42,444	8.80
Hardscape - Concrete (Assume 1/3rd of total area)	191,000	21,222	4.40

Asphalt Pavement	Area (SF)	Area (SY)	Area (ACR)
Asphalt Pavement - City Service Road (outside OU1 boundary)	12,000	1,333	1

Temporary Gravel Construction	Length (FT)	Width (FT)	Thickness (inches)
Gravel Road Base - Temporary Access Road	1,000	15	6.0
Gravel Laydown Area	50	50	6.0

Sheet Piling - Length (FT)	Depth (FT)	Area (SF)
330	10	3,300

Excavated Area/Full Site	Volume (BCF)	Volume (BCY)	Volume (LCY)
Total Excavated Soil:	573,000	21,222	24,406
Total Common Backfill Required:	286,500	10,611	12,203
Total Topsoil Required:	191,000	7,074	8,135

Number of Years to Complete:	0.4	years
Number of Months (April 1 to Nov 30):	3.2	months
4 Days off per month in 30 days months:	26	per month
Number of working days (385 cy/day)	82	days
Total number of working days.	82	days

Mine Disposal	
Assumed Density for Soil (TN/LCY)	1.375
Total Volume of Soil (LCY)	24,406
Total Weight of ACM Excavated (TN)	33,558

	SF	Acre
Clearing and Grubbing	45,100	2

Number Borrow Area Samples (1/10,000 CY)
3

Assumed Onsite Riprap Protection	Width (FT)	Length (FT)	Area (SF)
Riprap Protection (Assumed)	20	1,000	
Riprap Sectional Area (20' x 2.5')			50.0

Softscape Ratio	2/3
Hardscape Ratio	1/3
CY/Day	300
Expansion Factor	1.15

Excavation and Backfill System	Feet
Depth of Exavation	1.0
Thickness of Subsoil	0.5
Thickness of Topsoil	0.5

Confirmatory Soil Sampling	
Sample Density (Samples/SF)	15,000
Total Area to be Excavated (SF)	594,000
Total Number of Samples	40

Notes:
Input fields are denoted by a dashed line. Do not overwrite information not contained within the dashed lines.

Alternative 4
Calculation Worksheet
Required Materials Output Calculations

Site:	OU1 - Former Export Plant	Prepared By: AS	Date: 5/13/2008
Location:	Libby, Montana		
Phase:	Draft Feasibility Study	Checked By: AL	Date: 5/14/2008
Base Year:	2008		

Work Statement:
This calculation output sheet allows the user to calculate the volumes of various material required for backfill, access road and other material. Changes to the input fields on this calculation sheet will also change the quantities and types of materials for amendment of soils cover construction, reclamation and the resulting capital costs.

Output Fields-Required Materials	
Remedy Components	Sod (SF)
Excavated Area/Full Site	382,000
TOTALS:	382,000

Access Road Construction Components	Surface Area (SY)	Volume of Gravel (BCY)	Volume of Gravel (LCY)	Weight of Gravel (Ton)
Gravel Road Base - Temporary Access Road	1,667	300	345	500
Gravel Laydown Area	278	46	53	77

Assumed Onsite Riprap Protection	Area (SY)	Volume (BCY)	Volume (LCY)
Total Riprap Required:	2,222	1,852	2,130

Appendix C

Screening of Alternatives

The evaluations of each alternative using the three screening criteria are presented in the following Appendix C. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1
No Action

Exhibit C-1. Effectiveness Screening - Alternative 1

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated soils on the site are left unaddressed. ■ Unaddressed contaminated soils allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water) if disturbed. ■ If disturbed, contaminated soils could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River may erode the riverbank which could potentially cause migration of contaminated soils to surface water. Contaminated soils transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future.
Compliance with ARARs	■ No further action is taken to address contaminated soils; presence of unaddressed contaminated soils may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air. Thus this criterion is not met.
Short-term effectiveness (during the remedial construction and implementation period)	■ No further remedial action would be undertaken to address contaminated soils; thus, none of these criteria are met.
Long-term effectiveness and permanence (following remedial construction)	
Reduction of toxicity, mobility, or volume through treatment	
Overall Rating	⓪

Table C-2. Implementability Screening - Alternative 1

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ No further remedial action would be undertaken to address contaminated soils; thus, ability to meet these criteria is high.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	
Ability to obtain approvals from other agencies	■ Contaminated soils on the site would be left unaddressed. No remedial action would be undertaken to address the contaminated soils; thus, there is no need to obtain approvals from other regulatory agencies.
Availability and capacity of treatment, storage, and disposal services	■ Contaminated soils on the site are left unaddressed. No remedial action would be undertaken to address the contaminated soils; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ Technical specialists and equipment are available for monitoring during 5-year site reviews.
Overall Rating	❺

Table C-3. Cost Screening – Alternative 1

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Dollars)
Present Value Cost	$	$160,000

Alternative 2
Institutional/Engineered Controls with Monitoring

Table C-4. Effectiveness Screening - Alternative 2

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated soils on the site are addressed through institutional and engineered controls to exclude access and unacceptable uses of the site by human receptors. ■ Exposed contaminated soils allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water) if disturbed by human trespassers or ecological receptors. ■ If disturbed, contaminated soils could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. □ The Kootenai River may erode the riverbank which could potentially cause migration of contaminated soils to surface water. Contaminated soils transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Institutional/engineered controls do not physically address contaminated soils; presence of contaminated soils could cause exceedances of chemical-specific ARARs in air. ■ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Surface disturbance of contaminated soils could pose short-term risks to workers during installation of engineered controls. ■ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Short-term risks posed to the community during implementation of the alternative mainly relate to exposure to trespassers within the fenced areas of the site.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left exposed on site. □ The Kootenai River may erode the riverbank, especially during large flows, which could potentially cause migration of contaminated soils to surface water over time. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the engineered controls is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring of ambient air is necessary for ensuring protection of human health outside the fencing around the site.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative does not treat contaminated soils; thus this criterion is not met.
Overall Rating	❷

Table C-5. Implementability Screening - Alternative 2

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Implementation of engineered controls and monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and.or legal instruments proposed for OU1.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of engineered controls and implementation of monitoring are easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approvals for monitoring and engineered controls should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ This alternative does not call for any treatment, storage and disposal services; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	■ The property for implementing the remedial action has already been obtained. ■ Materials, equipment, and labor resources used for institutional/engineered controls and monitoring are easily obtainable. ■ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❹

Table C-6. Cost Screening – Alternative 2

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Dollars)
Present Value Cost	$	$700,000

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Table C-7. Effectiveness Screening - Alternative 3

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated soils are addressed through in-place containment (covers). ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. ◫ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Contaminated soils contained in-place with soil covers would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. ◫ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	◫ Surface disturbance of contaminated soils could pose short-term risks to workers during installation of covers.. ◫ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. ■ Temporary relocation of workers associated with the Search and Rescue Building may be required during construction. ■ Short-term risks posed to the community during implementation of the alternative mainly relate to exposure to trespassers within the exclusion zones of the site during construction.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left on site beneath the covers.. ◫ Long-term effectiveness and permanence of the covers and riprap is dependent on periodic inspection and O&M. □ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls.
Reduction of toxicity, mobility, or volume through treatment	◫ This alternative does not treat contaminated soils; thus this criterion is not met.
Overall Rating	❸

Table C-8. Implementability Screening - Alternative 3

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Construction of covers is relatively straightforward and can be reliably operated. ■ Implementation of monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of the soil cover system is relatively easy to implement. □ Implementation of monitoring is easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approval for in-place containment of contaminated soils using covers should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	□ This alternative does not call for any treatment, storage and disposal services; thus, this criterion is not applicable.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	□ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for cover construction are available. ■ Suitable cover construction materials would be required from offsite sources outside of the Libby valley. ■ Materials, equipment, and labor resources used for institutional controls and monitoring are easily obtainable. □ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❸

Table C-9. Cost Screening - Alternative 3

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Dollars)
Present Value Cost	$$	$3,830,000

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Table C-10. Effectiveness Screening - Alternative 4

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated soils are addressed through surface removal and offsite disposal at the Former Libby Vermiculite Mine. Excavations would be backfilled with clean soil from outside the Libby valley. □ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors. □ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Contaminated soils removed and disposed of offsite coupled with backfilling excavations would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. □ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Removal and offsite disposal of contaminated soils could pose short-term risks to workers. ■ Short-term risks posed to the community during implementation of the alternative include exposure to trespassers within the exclusion zones of the site during construction. ■ There would be additional impacts to the community under this alternative, as additional truck traffic would be required for offsite disposal of contaminated soils as well as transport of clean backfill soils. □ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. □ Temporary relocation of workers associated with the Search and Rescue Building may be required during construction.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for surface soils at the site is addressed through removal of contaminated soils with offsite disposal at the Former Libby Vermiculite Mine and backfilling with clean soil. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left on site beneath the backfilled areas □ Long-term effectiveness and permanence of the backfilled areas and riprap is dependent on periodic inspection and O&M. □ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls.
Reduction of toxicity, mobility, or volume through treatment	□ This alternative does not treat contaminated soils; thus this criterion is not met.
Overall Rating	❸

Table C-11. Implementability Screening - Alternative 4

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Removal and offsite disposal of contaminated soils at the Former Libby Vermiculite Mine and backfilling excavations with clean soil is relatively straightforward. ■ Removed contaminated soils would require transportation for offsite disposal in enclosed trucks. ■ Excavation and backfilling around the onsite facilities, subsurface utilities (if any), and roads may be challenging at specific locations. □ Implementation of monitoring is relatively straightforward to implement and reliably operate. □ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	■ Inspection, maintenance, and replacement of backfilled areas is relatively easy to implement. □ Implementation of monitoring is easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ Regulatory approval needed to remove and transport contaminated soils should be obtainable. □ Regulatory approvals for monitoring should be obtainable. □ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ The former Libby Vermiculite Mine is available for disposal and has the capacity to accept the total volume of excavated contaminated soils.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	□ The property for implementing the remedial action has already been obtained. ■ Labor, equipment, and materials for contaminated soils removal and clean soil backfilling are available. ■ Suitable backfill materials would be required from offsite sources outside of the Libby valley. □ Materials, equipment, and labor resources used for institutional controls and monitoring are easily obtainable. □ Technical specialists and equipment are available for implementation the remedy.
Overall Rating	❷

Table C-12. Cost Screening - Alternative 4

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Dollars)
Present Value Cost	$$$	$4,860,000

Alternative 5

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

Table C-13. Effectiveness Screening - Alternative 5

Effectiveness Criteria	Evaluation Summary
Overall protection of human health and the environment	■ Contaminated soils are addressed through surface removal and offsite treatment at a permitted thermo-chemical treatment facility. ■ ACM is converted to an inert form that does not pose human health risks. Excavations would be backfilled with a combination of treated inert material supplemented with clean soil from outside the Libby valley. □ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors. □ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Monitoring would be required for effectiveness of the remedy.
Compliance with ARARs	■ Contaminated soils removed and treated of offsite coupled with backfilling excavations would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air. □ Location- and action-specific ARARs for the remedy would be addressed during implementation.
Short-term effectiveness (during the remedial construction and implementation period)	■ Removal and offsite treatment of contaminated soils could pose short-term risks to workers both at the site and the treatment facility. ■ Short-term risks posed to the community during implementation of the alternative include exposure to trespassers within the exclusion zones of the site during construction. ■ There would be additional impacts to the community under this alternative, as additional truck traffic would be required for offsite treatment of contaminated soils as well as transport of treated inert material and clean backfill soils. □ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers and the community during implementation. □ Temporary relocation of workers associated with the Search and Rescue Building may be required during construction.
Long-term effectiveness and permanence (following remedial construction)	■ Long-term effectiveness and permanence for surface soils at the site is addressed through removal of contaminated soils with offsite treatment at a permitted thermo-chemical treatment facility and backfilling with inert treated material and clean soil. ■ While studies provided by ARI indicate that the treatment process completely converts ACM to an inert form, the treatment process is relatively new and there is not extensive data indicating whether the treatment process has long-term effectiveness and permanence. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left on site beneath the backfilled areas. ■ Long-term effectiveness and permanence of the backfilled areas and riprap is dependent on periodic inspection and O&M. ■ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls.
Reduction of toxicity, mobility, or volume through treatment	■ This alternative involves treatment, which transforms asbestos to an amorphous inert form; thus, toxicity and mobility of asbestos fibers is eliminated. ■ Volume reduction of contaminated soils is limited.
Overall Rating	❸

Table C-14. Implementability Screening - Alternative 5

Implementability Criteria	Evaluation Summary
Ability to construct, reliably operate, and meet technology-specific regulations for process options until a remedial action is complete	■ Removal of contaminated soils and backfilling excavations with treated inert material and clean soil is relatively straightforward. ■ Removed contaminated soils require transportation to the offsite treatment facility in enclosed trucks. ■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ TCCT is permitted in the Washington State and is regulated under Federal and state regulations. □ Excavation and backfilling around the onsite facilities, subsurface utilities (if any), and roads may be challenging at specific locations. □ Implementation of monitoring is relatively straightforward to implement and reliably operate. □ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1.
Ability to operate, maintain, replace, and monitor technical components after the remedial action is complete	□ Inspection, maintenance, and replacement of backfilled areas is relatively easy to implement. □ Implementation of monitoring is easily implemented. □ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used.
Ability to obtain approvals from other agencies	■ This technology is permitted and regulated in Washington State, so the required regulatory approval should be obtainable. □ Regulatory approval needed to remove and transport contaminated soils should be obtainable. ■ Regulatory approval for use of treated material as backfill material my be problematic, depending on DEQ classification of the treated material. □ Regulatory approvals for monitoring should be obtainable. □ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
Availability and capacity of treatment, storage, and disposal services	■ The treatment process (TCCT) is a patented technology and is commercially available but not widespread. ■ The treatment capacity depends upon the size of the offsite treatment facility; in general the capacity for treatment should be acceptable relative to the volume of contaminated soils generated from the site, based on discussions with ARI.
Availability of property, specific materials and equipment, and technical specialists required for a remedial action	□ The property for implementing the remedial action has already been obtained. □ Labor, equipment, and materials for contaminated soils removal and clean soil backfilling are available. □ Suitable backfill materials would be required from offsite sources outside of the Libby valley. □ Materials, equipment, and labor resources used for institutional controls and monitoring are easily obtainable. ■ Technical specialists and equipment for implementation of thermo-chemical treatment are fairly limited in the United States. ■ Technical specialists and equipment are available for implementation of institutional controls and monitoring.
Overall Rating	❶

Table C-15. Cost Screening - Alternative 5

Evaluation Factors for Cost	Overall Rating	Approx. Cost (Dollars)
Present Value Cost	$$$$$	$24,410,000

Appendix D

Alternative Screening Cost Information

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Present Value Analyses

TABLE SPV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083	36	0.0875
11	0.4751	37	0.0818
12	0.4440	38	0.0765
13	0.4150	39	0.0715
14	0.3878	40	0.0668
15	0.3624	41	0.0624
16	0.3387	42	0.0583
17	0.3166	43	0.0545
18	0.2959	44	0.0509
19	0.2765	45	0.0476
20	0.2584	46	0.0445
21	0.2415	47	0.0416
22	0.2257	48	0.0389
23	0.2109	49	0.0363
24	0.1971	50	0.0339
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE SPV-1

PRESENT VALUE ANALYSIS

Alternative 1
No Action

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs[2]	Annual O&M Costs	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	$0	0.9346	$0
2	$0	$0	$0	$0	0.8734	$0
3	$0	$0	$0	$0	0.8163	$0
4	$0	$0	$0	$0	0.7629	$0
5	$0	$0	$75,000	$75,000	0.7130	$53,475
6	$0	$0	$0	$0	0.6663	$0
7	$0	$0	$0	$0	0.6227	$0
8	$0	$0	$0	$0	0.5820	$0
9	$0	$0	$0	$0	0.5439	$0
10	$0	$0	$75,000	$75,000	0.5083	$38,123
11	$0	$0	$0	$0	0.4751	$0
12	$0	$0	$0	$0	0.4440	$0
13	$0	$0	$0	$0	0.4150	$0
14	$0	$0	$0	$0	0.3878	$0
15	$0	$0	$75,000	$75,000	0.3624	$27,180
16	$0	$0	$0	$0	0.3387	$0
17	$0	$0	$0	$0	0.3166	$0
18	$0	$0	$0	$0	0.2959	$0
19	$0	$0	$0	$0	0.2765	$0
20	$0	$0	$75,000	$75,000	0.2584	$19,380
21	$0	$0	$0	$0	0.2415	$0
22	$0	$0	$0	$0	0.2257	$0
23	$0	$0	$0	$0	0.2109	$0
24	$0	$0	$0	$0	0.1971	$0
25	$0	$0	$75,000	$75,000	0.1842	$13,815
26	$0	$0	$0	$0	0.1722	$0
27	$0	$0	$0	$0	0.1609	$0
28	$0	$0	$0	$0	0.1504	$0
29	$0	$0	$0	$0	0.1406	$0
30	$0	$0	$75,000	$75,000	0.1314	$9,855
TOTALS:	$0	$0	$450,000	$450,000		$161,828
TOTAL PRESENT VALUE OF ALTERNATIVE 1[5]						**$160,000**

Notes:

[1] *Duration is assumed to be 30 years for present value analysis.*

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-1.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-2

PRESENT VALUE ANALYSIS

Alternative 2
Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs (Institutional and Engineered Controls)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$315,000	$0	$0	$315,000	0.9346	$294,399
2	$0	$23,000	$0	$23,000	0.8734	$20,088
3	$0	$23,000	$0	$23,000	0.8163	$18,775
4	$0	$23,000	$0	$23,000	0.7629	$17,547
5	$0	$23,000	$0	$23,000	0.7130	$16,399
6	$0	$23,000	$75,000	$98,000	0.6663	$65,297
7	$0	$23,000	$0	$23,000	0.6227	$14,322
8	$0	$23,000	$0	$23,000	0.5820	$13,386
9	$0	$23,000	$0	$23,000	0.5439	$12,510
10	$0	$23,000	$0	$23,000	0.5083	$11,691
11	$0	$23,000	$75,000	$98,000	0.4751	$46,560
12	$0	$23,000	$0	$23,000	0.4440	$10,212
13	$0	$23,000	$0	$23,000	0.4150	$9,545
14	$0	$23,000	$0	$23,000	0.3878	$8,919
15	$0	$23,000	$0	$23,000	0.3624	$8,335
16	$0	$23,000	$75,000	$98,000	0.3387	$33,193
17	$0	$23,000	$0	$23,000	0.3166	$7,282
18	$0	$23,000	$0	$23,000	0.2959	$6,806
19	$0	$23,000	$0	$23,000	0.2765	$6,360
20	$0	$23,000	$0	$23,000	0.2584	$5,943
21	$0	$23,000	$75,000	$98,000	0.2415	$23,667
22	$0	$23,000	$0	$23,000	0.2257	$5,191
23	$0	$23,000	$0	$23,000	0.2109	$4,851
24	$0	$23,000	$0	$23,000	0.1971	$4,533
25	$0	$23,000	$0	$23,000	0.1842	$4,237
26	$0	$23,000	$75,000	$98,000	0.1722	$16,876
27	$0	$23,000	$0	$23,000	0.1609	$3,701
28	$0	$23,000	$0	$23,000	0.1504	$3,459
29	$0	$23,000	$0	$23,000	0.1406	$3,234
30	$0	$23,000	$0	$23,000	0.1314	$3,022
TOTALS:	$315,000	$667,000	$375,000	$1,357,000		$700,340
TOTAL PRESENT VALUE OF ALTERNATIVE 2[5]						**$700,000**

Notes:
[1] Duration is assumed to be 30 years for present value analysis.
[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-2.
[3] Total annual expenditure is the total cost per year with no discounting.
[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.
[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-3

PRESENT VALUE ANALYSIS

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs (Institutional Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$67,000	$3,602,000	$0	$0	$3,669,000	0.9346	$3,429,047
2	$0	$0	$23,000	$0	$23,000	0.8734	$20,088
3	$0	$0	$23,000	$0	$23,000	0.8163	$18,775
4	$0	$0	$23,000	$0	$23,000	0.7629	$17,547
5	$0	$0	$23,000	$0	$23,000	0.7130	$16,399
6	$0	$0	$23,000	$75,000	$98,000	0.6663	$65,297
7	$0	$0	$23,000	$0	$23,000	0.6227	$14,322
8	$0	$0	$23,000	$0	$23,000	0.5820	$13,386
9	$0	$0	$23,000	$0	$23,000	0.5439	$12,510
10	$0	$0	$23,000	$0	$23,000	0.5083	$11,691
11	$0	$0	$23,000	$75,000	$98,000	0.4751	$46,560
12	$0	$0	$23,000	$0	$23,000	0.4440	$10,212
13	$0	$0	$23,000	$0	$23,000	0.4150	$9,545
14	$0	$0	$23,000	$0	$23,000	0.3878	$8,919
15	$0	$0	$23,000	$0	$23,000	0.3624	$8,335
16	$0	$0	$23,000	$75,000	$98,000	0.3387	$33,193
17	$0	$0	$23,000	$0	$23,000	0.3166	$7,282
18	$0	$0	$23,000	$0	$23,000	0.2959	$6,806
19	$0	$0	$23,000	$0	$23,000	0.2765	$6,360
20	$0	$0	$23,000	$0	$23,000	0.2584	$5,943
21	$0	$0	$23,000	$75,000	$98,000	0.2415	$23,667
22	$0	$0	$23,000	$0	$23,000	0.2257	$5,191
23	$0	$0	$23,000	$0	$23,000	0.2109	$4,851
24	$0	$0	$23,000	$0	$23,000	0.1971	$4,533
25	$0	$0	$23,000	$0	$23,000	0.1842	$4,237
26	$0	$0	$23,000	$75,000	$98,000	0.1722	$16,876
27	$0	$0	$23,000	$0	$23,000	0.1609	$3,701
28	$0	$0	$23,000	$0	$23,000	0.1504	$3,459
29	$0	$0	$23,000	$0	$23,000	0.1406	$3,234
30	$0	$0	$23,000	$0	$23,000	0.1314	$3,022
TOTALS:	$67,000	$3,602,000	$667,000	$375,000	$4,711,000		$3,834,988
TOTAL PRESENT VALUE OF ALTERNATIVE 3[5]							**$3,830,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-3.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-4

PRESENT VALUE ANALYSIS

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs (Institutional Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$67,000	$4,703,000	$0	$0	$4,770,000	0.9346	$4,458,042
2	$0	$0	$23,000	$0	$23,000	0.8734	$20,088
3	$0	$0	$23,000	$0	$23,000	0.8163	$18,775
4	$0	$0	$23,000	$0	$23,000	0.7629	$17,547
5	$0	$0	$23,000	$0	$23,000	0.7130	$16,399
6	$0	$0	$23,000	$75,000	$98,000	0.6663	$65,297
7	$0	$0	$23,000	$0	$23,000	0.6227	$14,322
8	$0	$0	$23,000	$0	$23,000	0.5820	$13,386
9	$0	$0	$23,000	$0	$23,000	0.5439	$12,510
10	$0	$0	$23,000	$0	$23,000	0.5083	$11,691
11	$0	$0	$23,000	$75,000	$98,000	0.4751	$46,560
12	$0	$0	$23,000	$0	$23,000	0.4440	$10,212
13	$0	$0	$23,000	$0	$23,000	0.4150	$9,545
14	$0	$0	$23,000	$0	$23,000	0.3878	$8,919
15	$0	$0	$23,000	$0	$23,000	0.3624	$8,335
16	$0	$0	$23,000	$75,000	$98,000	0.3387	$33,193
17	$0	$0	$23,000	$0	$23,000	0.3166	$7,282
18	$0	$0	$23,000	$0	$23,000	0.2959	$6,806
19	$0	$0	$23,000	$0	$23,000	0.2765	$6,360
20	$0	$0	$23,000	$0	$23,000	0.2584	$5,943
21	$0	$0	$23,000	$75,000	$98,000	0.2415	$23,667
22	$0	$0	$23,000	$0	$23,000	0.2257	$5,191
23	$0	$0	$23,000	$0	$23,000	0.2109	$4,851
24	$0	$0	$23,000	$0	$23,000	0.1971	$4,533
25	$0	$0	$23,000	$0	$23,000	0.1842	$4,237
26	$0	$0	$23,000	$75,000	$98,000	0.1722	$16,876
27	$0	$0	$23,000	$0	$23,000	0.1609	$3,701
28	$0	$0	$23,000	$0	$23,000	0.1504	$3,459
29	$0	$0	$23,000	$0	$23,000	0.1406	$3,234
30	$0	$0	$23,000	$0	$23,000	0.1314	$3,022
TOTALS:	$67,000	$4,703,000	$667,000	$375,000	$5,812,000		$4,863,983
TOTAL PRESENT VALUE OF ALTERNATIVE 4[5]							**$4,860,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-4.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

TABLE SPV-5

PRESENT VALUE ANALYSIS

Alternative 5

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs (Institutional Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Site Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$67,000	$13,259,000	$0	$0	$13,326,000	0.9346	$12,454,480
2	$0	$13,259,000	$0	$0	$13,259,000	0.8734	$11,580,411
3	$0	$0	$23,000	$0	$23,000	0.8163	$18,775
4	$0	$0	$23,000	$0	$23,000	0.7629	$17,547
5	$0	$0	$23,000	$0	$23,000	0.7130	$16,399
6	$0	$0	$23,000	$0	$23,000	0.6663	$15,325
7	$0	$0	$23,000	$75,000	$98,000	0.6227	$61,025
8	$0	$0	$23,000	$0	$23,000	0.5820	$13,386
9	$0	$0	$23,000	$0	$23,000	0.5439	$12,510
10	$0	$0	$23,000	$0	$23,000	0.5083	$11,691
11	$0	$0	$23,000	$0	$23,000	0.4751	$10,927
12	$0	$0	$23,000	$75,000	$98,000	0.4440	$43,512
13	$0	$0	$23,000	$0	$23,000	0.4150	$9,545
14	$0	$0	$23,000	$0	$23,000	0.3878	$8,919
15	$0	$0	$23,000	$0	$23,000	0.3624	$8,335
16	$0	$0	$23,000	$0	$23,000	0.3387	$7,790
17	$0	$0	$23,000	$75,000	$98,000	0.3166	$31,027
18	$0	$0	$23,000	$0	$23,000	0.2959	$6,806
19	$0	$0	$23,000	$0	$23,000	0.2765	$6,360
20	$0	$0	$23,000	$0	$23,000	0.2584	$5,943
21	$0	$0	$23,000	$0	$23,000	0.2415	$5,555
22	$0	$0	$23,000	$75,000	$98,000	0.2257	$22,119
23	$0	$0	$23,000	$0	$23,000	0.2109	$4,851
24	$0	$0	$23,000	$0	$23,000	0.1971	$4,533
25	$0	$0	$23,000	$0	$23,000	0.1842	$4,237
26	$0	$0	$23,000	$0	$23,000	0.1722	$3,961
27	$0	$0	$23,000	$75,000	$98,000	0.1609	$15,768
28	$0	$0	$23,000	$0	$23,000	0.1504	$3,459
29	$0	$0	$23,000	$0	$23,000	0.1406	$3,234
30	$0	$0	$23,000	$0	$23,000	0.1314	$3,022
TOTALS:	$67,000	$26,518,000	$644,000	$375,000	$27,604,000		$24,411,452
TOTAL PRESENT VALUE OF ALTERNATIVE 5[5]							**$24,410,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table SCS-5.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table SPV-ADRIFT for details.

[5] Total present value is rounded to the nearest $10,000. Inflation and depreciation are excluded from the present value cost.

Screening Cost Estimate Summaries

TABLE SCS-1

Alternative 1
No Action

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$50,000	$50,000	Includes 5-year site inspection and review report
SUBTOTAL				$50,000	
Contingency (Scope and Bid)	20%			$10,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$60,000	
Project Management	10%			$6,000	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$9,000	Middle value of the recommended range was used.
TOTAL				$75,000	
TOTAL PERIODIC COST				**$75,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Refer to Table SCS-Notes for cost sources and explanation for various unit costs.
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:
EA Each
LS Lump Sum
QTY Quantity

TABLE SCS-2

Alternative 2
Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU1 site
Engineered Controls	5,700	FT	$25	$142,500	Includes fencing and warning signage around the site boundary
SUBTOTAL				$177,500	
Contingency (Scope and Bid)	20%			$35,500	*10% Scope, 10% Bid (Low end of the recommended range).*
SUBTOTAL				$213,000	
Project Management	8%			$17,040	Percentage from Exhibit 5-8 was used.
Remedial Design	15%			$31,950	Percentage from Exhibit 5-8 was used.
Construction Management	10%			$21,300	*Percentage from Exhibit 5-8 was used.*
Technical Support	15%			$31,950	Middle value of the recommended range was used.
TOTAL				$315,240	
TOTAL CAPITAL COST				**$315,000**	Total capital cost is rounded to the nearest $1,000.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 2 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$5,000	$5,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$10,000	$10,000	Includes inspection of the remedy put in place
SUBTOTAL				$15,000	
Contingency (Scope and Bid)	20%			$3,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$18,000	
Project Management	10%			$1,800	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$2,700	*Middle value of the recommended range was used.*
TOTAL				$22,500	
TOTAL PERIODIC COST				**$23,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-2

Alternative 2
Institutional/Engineered Controls in Area 1 and Area 2 with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

5-YEAR SITE REVIEW PERIODIC COSTS (Years 6, 11, 16, 21, and 26)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$50,000	$50,000	Includes 5-year site inspection and review report
SUBTOTAL				$50,000	
Contingency (Scope and Bid)	20%			$10,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$60,000	
Project Management	10%			$6,000	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$9,000	Middle value of the recommended range was used.
TOTAL				$75,000	
TOTAL PERIODIC COST				**$75,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:
ABS Activity Based Sampling
EA Each
FT Feet
LS Lump Sum
QTY Quantity

TABLE SCS-3

Alternative 3

SCREENING COST ESTIMATE SUMMARY

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU1 site
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	Percentage from Exhibit 5-8 was used.
Remedial Design	20%			$8,400	Percentage from Exhibit 5-8 was used.
Construction Management	15%			$6,300	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$6,300	Middle value of the recommended range was used.
TOTAL				$67,200	
TOTAL CAPITAL COST				**$67,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
In-Place Containment	14	ACR	$160,000	$2,240,000	Includes site clearing, mob/demob, in-place containment and revegetation
SUBTOTAL				$2,240,000	
Contingency (Scope and Bid)	20%			$448,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$2,688,000	
Project Management	5%			$134,400	Percentage from Exhibit 5-8 was used.
Remedial Design	8%			$215,040	Percentage from Exhibit 5-8 was used.
Construction Management	6%			$161,280	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$403,200	Middle value of the recommended range was used.
TOTAL				$3,601,920	
TOTAL CAPITAL COST				**$3,602,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-3

Alternative 3

SCREENING COST ESTIMATE SUMMARY

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 2 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$5,000	$5,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$10,000	$10,000	Includes inspection of the remedy put in place
SUBTOTAL				$15,000	
Contingency (Scope and Bid)	20%			$3,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$18,000	
Project Management	10%			$1,800	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$2,700	Middle value of the recommended range was used.
TOTAL				$22,500	
TOTAL PERIODIC COST				**$23,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 6, 11, 16, 21, and 26)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$50,000	$50,000	Includes 5-year site inspection and review report
SUBTOTAL				$50,000	
Contingency (Scope and Bid)	20%			$10,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$60,000	
Project Management	10%			$6,000	The high end of the recommended range was used.
Technical Support	15%			$9,000	Middle value of the recommended range was used.
TOTAL				$75,000	
TOTAL PERIODIC COST				**$75,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:
ABS Activity Based Sampling
ACR Acre
EA Each
FT Feet
LS Lump Sum
QTY Quantity

TABLE SCS-4

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU1 site
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	Percentage from Exhibit 5-8 was used.
Remedial Design	20%			$8,400	Percentage from Exhibit 5-8 was used.
Construction Management	15%			$6,300	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$6,300	Middle value of the recommended range was used.
TOTAL				$67,200	
TOTAL CAPITAL COST				**$67,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Removal and Transport of Contaminated Soils	25,000	CY	$110	$2,750,000	Includes site clearing, mob/demob, removal and waste transportation to the mine
Handling and Disposal of Contaminated Soils	25,000	CY	$7	$175,000	Includes handling of contaminated soils at the mine
SUBTOTAL				$2,925,000	
Contingency (Scope and Bid)	20%			$585,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$3,510,000	
Project Management	5%			$175,500	Percentage from Exhibit 5-8 was used.
Remedial Design	8%			$280,800	Percentage from Exhibit 5-8 was used.
Construction Management	6%			$210,600	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$526,500	Middle value of the recommended range was used.
TOTAL				$4,703,400	
TOTAL CAPITAL COST				**$4,703,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-4

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: *2008*
Date: May 22, 2008

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 2 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$5,000	$5,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$10,000	$10,000	Includes inspection of the remedy put in place
SUBTOTAL				$15,000	
Contingency (Scope and Bid)	20%			$3,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$18,000	
Project Management	10%			$1,800	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$2,700	Middle value of the recommended range was used.
TOTAL				$22,500	
TOTAL PERIODIC COST				**$23,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$50,000	$50,000	Includes 5-year site inspection and review report
SUBTOTAL				$50,000	
Contingency (Scope and Bid)	20%			$10,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$60,000	
Project Management	10%			$6,000	The high end of the recommended range was used.
Technical Support	15%			$9,000	Middle value of the recommended range was used.
TOTAL				$75,000	
TOTAL PERIODIC COST				**$75,000**	Total capital cost is rounded to the nearest $1,000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity
TN	Ton

TABLE SCS-5

Alternative 5
Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	1	LS	$35,000	$35,000	Institutional controls for OU1 site
SUBTOTAL				$35,000	
Contingency (Scope and Bid)	20%			$7,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$42,000	
Project Management	10%			$4,200	Percentage from Exhibit 5-8 was used.
Remedial Design	20%			$8,400	Percentage from Exhibit 5-8 was used.
Construction Management	15%			$6,300	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$6,300	Middle value of the recommended range was used.
TOTAL				$67,200	
TOTAL CAPITAL COST				**$67,000**	*Total capital cost is rounded to the nearest $1,000.*

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Year 1, 2, 3, 4, and 5

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Removal and Transport of Contaminated Soils	25,000	CY	$100	$2,500,000	Includes site clearing, mob/demob, removal and waste transportation to treatment facility
Treatment of Contaminated Soils	30,300	TN	$470	$14,241,000	Includes waste Treatment by Thermo-Chemical Process
SUBTOTAL				$16,741,000	
Contingency (Scope and Bid)	20%			$3,348,200	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$20,089,200	
Project Management	5%			$1,004,460	Percentage from Exhibit 5-8 was used.
Remedial Design	6%			$1,205,352	Percentage from Exhibit 5-8 was used.
Construction Management	6%			$1,205,352	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$3,013,380	Middle value of the recommended range was used.
TOTAL				$26,517,744	
TOTAL CAPITAL COST				**$26,518,000**	Total capital cost is rounded to the nearest $1,000.

TABLE SCS-5

Alternative 5
Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Thermo-Chemical Treatment, Reuse of Treated Material, and Institutional Controls with Monitoring

SCREENING COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 3 through 30

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Annual Maintenance	1	LS	$5,000	$5,000	Includes maintenance of the remedy put in place
Annual Inspection	1	YR	$10,000	$10,000	Includes inspection of the remedy put in place
SUBTOTAL				$15,000	
Contingency (Scope and Bid)	20%			$3,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$18,000	
Project Management	10%			$1,800	Percentage from Exhibit 5-8 was used.
Technical Support	15%			$2,700	Middle value of the recommended range was used.
TOTAL				$22,500	
TOTAL PERIODIC COST				**$23,000**	Total capital cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 10, 15, 20, 25, and 30)

DESCRIPTION	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Review	1	LS	$50,000	$50,000	Includes 5-year site inspection and review report
SUBTOTAL				$50,000	
Contingency (Scope and Bid)	20%			$10,000	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL				$60,000	
Project Management	10%			$6,000	The high end of the recommended range was used.
Technical Support	15%			$9,000	Middle value of the recommended range was used.
TOTAL				$75,000	
TOTAL PERIODIC COST				**$75,000**	Total capital cost is rounded to the nearest $1,000.

Abbreviations:

ABS	Activity Based Sampling
ACR	Acre
CY	Cubic Yard
EA	Each
FT	Feet
LS	Lump Sum
QTY	Quantity
TN	Ton

Appendix E

Monitoring Protocol for Retained Alternatives

TABLE E-1

DETAILED MONITORING PROTOCOLS FOR RETAINED ALTERNATIVES

Alternative	Assumed Land Use	Active General Response Action Components						Monitoring Requirements			
		No Action	Institutional Controls	Containment	Removal, Transport and Disposal			Inspection and Sampling			5-Yr Site Review
				Cover	Removal	Offsite Transport	Offsite Disposal	Borrow Source Sampling	Removal Confirmatory Sampling	Visual Remedy Component Inspections	5-Yr Review Site Inspection
Alternative 1	Recreational	✓									✓
Alternative 3			✓	✓				✓		✓	✓
Alternative 4			✓		✓	✓	✓	✓	✓	✓	✓

Note:
Alternative 1: No Action
Alternative 3: In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring
Alternative 4: Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Description of the various monitoring activities are presented in Section 2.5 of the FS.

No Action	Discontinue all current remedial activities and no further action would be initiated at the site to address contaminated soils or otherwise mitigate the associated risks to human health or the environment.
Institutional Controls	All alternatives except Alternative 1 (No Action) to be addressed as needed by institutional controls (governmental controls, proprietary controls, and/or informational devices) to protect the remedy put in place.
Cover	All contaminated surface soils at OU1 would be covered (12" of subsoil and 6" of topsoil) using a clean offsite borrow source area outside of the Libby valley.
Removal	All contaminated surface soils at OU1 site would be initially excavated to a depth of 1 feet bgs and then backfilled with clean backfill (soil) from an offsite borrow source area outside of Libby valley. Additional iterative excavation may be required up to depth of 3 feet bgs based on results of confirmation samples.
Offsite Transport/Disposal	All the removed contaminated soils would be transported and disposed of at the Former Libby Vermiculite Mine.
Borrow Sampling	Used to determine whether asbestos fibers or any other contaminants are present in proposed borrow source. One 30-point composite sample (PLM, Stereomicroscopy analysis) for every 10,000 cubic yards of borrow material.
Removal Confirmatory Sampling	Used to determine whether LA is present in excavation floor. Assume 1 sampling event at each excavation, one 30-point composite sample (PLM, Stereomicroscopy analysis) for every 15,000 square feet of excavation or a minimum of one sample per excavation. This would be perfomed initially at the 1 foot depth, and as needed for every 6 inch lift that indicates LA above 1%.
Visual Remedy Component Inspections	Visual inspection would be conducted annually to check the integrity of the remedial components of the remedy put in place.
5-Yr Review Site Inspection	5-yr site inspection used per NCP to document changes in site conditions that affect protectiveness. 1 inspection event during every 5-yr period. The inspection will also include inspecting the integrity of all the remedial components of the remedy put in place to determine protectiveness.

Appendix F

Detailed Analysis of Retained Alternatives

The detailed evaluation and analysis of each alternative is assessed using the two threshold criteria and five balancing criteria are presented in the following Appendix F. The common justifications have been indicated using gray text to allow the reader to focus on the differences between alternatives.

Alternative 1
No Action

Table F-1. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 1

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ Contaminated soils on the site are left unaddressed. ■ Unaddressed contaminated soils allow continued release and migration of asbestos fibers to unimpacted media (primarily soil, air, and surface water) if disturbed. ■ If disturbed, contaminated soils could liberate asbestos fibers to air and potentially represent an inhalation exposure risk to human receptors. ■ The Kootenai River may erode the riverbank which could potentially cause migration of contaminated soils to surface water. Contaminated soils transported by surface water could be redeposited in a terrestrial environment and potentially represent an inhalation exposure risk to human receptors and the environment in the future. ■ PRAOs are unaddressed.

Table F-2. Evaluation Summary for Compliance with ARARs – Alternative 1

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ No further action is taken to address contaminated soils; presence of unaddressed contaminated soils may not be compliant with NESHAP and could cause exceedances of chemical-specific ARARs in air; thus this criterion is not met.
Compliance with Location-Specific ARARs	■ No further action is taken to address contaminated soils; thus this criterion is not met.
Compliance with Action-Specific ARARs	■ Action-specific ARARs are not triggered since no further remedial measures would be undertaken.

Table F-3. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 1

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ No further remedial action would be undertaken to address contaminated soils. ■ Contaminated soils would be left exposed to human receptors and environment.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site	■ No controls are put in place under the "no action" alternative; thus, the only controls are those put in during previous interim remedial actions. ■ The controls placed during previous interim remedial actions (clean backfill over contaminated soils and riprap along the stream bank) have been partially compromised by maintenance activities in Riverside Park. ■ Asbestos fibers from the unaddressed contaminated soils could migrate to other media and could pose unacceptable risks to human health.

Table F-4. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 1

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	■ This alternative does not treat the contaminated soils; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ■ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-5. Short-Term Effectiveness Evaluation Summary – Alternative 1

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	■ Contaminated soils pose potential short-term risks at the site, which are unaddressed under this alternative. ■ Continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) could pose a risk to human receptors. ■ The alternative only includes monitoring; implementation of monitoring does not pose additional short-term risks to the community.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	■ Workers performing monitoring (site inspections) during 5-year site reviews would potentially be exposed to asbestos fibers released from the contaminated soils that pose unacceptable risks. ■ These risks can be mitigated through the use of engineered controls and personal protective equipment.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ No further remedial action other than monitoring would be undertaken, thus, there are no potential adverse impacts resulting from implementation of the alternative.
Time until protection is achieved	■ No further remedial action would be undertaken to address contaminated soils; thus protection is not achieved under this alternative.

Table F-6. Implementability Evaluation Summary – Alternative 1

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Under this alternative no further remedial action would be undertaken to address contaminated soils. ■ Site inspections, which are part of Alternative 1 would be performed during 5-year reviews and could be easily implemented with available labor, material and technical resources.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	
	Ease of undertaking additional remedial actions including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ No remedial action would be undertaken to address the site other than monitoring; approvals from other regulatory agencies to perform monitoring should be easily obtainable.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ No offsite remedial activities would be conducted under this alternative.
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ No further remedial action would be undertaken, thus this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	■ Technical specialists and equipment are available for conducting inspections during 5-year site reviews.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table F-7. Cost Evaluation Summary – Alternative 1

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	None
Total Annual O&M Cost	None
Total Periodic Cost	$426,000
Total Present Value Cost	$153,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Table F-8. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 3

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated surface soils at OU1 are addressed through in-place containment (soil covers), institutional controls, and monitoring. ■ Containment (soil cover) of contaminated soils would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air). ■ Soil covers placed over contaminated soils would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Long-term effectiveness and permanence of the covers and riprap is dependent on periodic inspection and O&M. ■ Long-term protection to human health and environment is not ensured since contaminated soils potentially posing a risk are left on site beneath the covers; if covers are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the covers and riprap. □ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the cover for integrity and adherence to institutional controls. ■ PRAOs are addressed under this alternative through in-place containment of contaminated soils, institutional controls, and monitoring.

Table F-9. Evaluation Summary for Compliance with ARARs – Alternative 3

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ Contaminated soils contained in-place with soil covers would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air.
Compliance with Location-Specific ARARs	■ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with Action-Specific ARARs	■ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action. Specifically, the cover requirements specified under NESHAP (40 CFR 61.151) are a potential consideration.

Table F-10. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 3

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Containment (soil cover) of contaminated soils would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Long-term effectiveness and permanence of the covers and riprap is dependent on periodic inspection and O&M. ■ Long-term protection to human health and environment is not ensured since contaminated soils potentially posing a risk are left on site beneath the covers; if covers are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the covers and riprap. □ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the cover for integrity and adherence to institutional controls.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ In-place containment of contaminated soils using covers are a reliable control if properly maintained. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left on site beneath the covers. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Long-term effectiveness and permanence of the covers and riprap is dependent on periodic inspection and O&M to repair erosion or other damage to the covers and riprap. ■ Although institutional controls will be implemented, adequacy and reliability of institituional controls is dependent on administrative and legal enforcement of the controls. □ Monitoring would be required for effectiveness of the remedy through periodic inspections of the cover for integrity and adherence to institutional controls.

Table F-11. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 3

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	☐ This alternative does not treat the contaminated soils; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ☐ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-12. Short-Term Effectiveness Evaluation Summary – Alternative 3

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	▪ The alternative involves disturbance of contaminated soils, which could pose short-term risks to the community living close to the site boundary, employees at the search and resuce building, and park visitors from inhalation of asbestos fibers. ▪ There would be additional short-term impacts to the community under this alternative, such as truck traffic to deliver cover soils. ▪ Safety measures such as dust suppression and establishment of work zones (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. ▪ Temporary relocation of workers associated with Search and Rescue Building may be required during construction. ▪ Partial or full closure of Riverside Park would be required during construction. ▪ Short-term risks posed to the community during implementation of the alternative after implementing protective controls and measures mainly relate to trespassers within the exclusion zone.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	▪ The alternative involves disturbance of contaminated soils, which could pose short-term risks to workers from inhalation of asbestos fibers. ▪ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during implementation. ▪ Other potential impacts can be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards. ▪ These other potential impacts would be mitigate through adherence to safety requirements and standard operating procedures.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	▪ Short-term impacts to the Kootenai River could occur during implementation, especially along the riverbank. ▪ Protective measures, such as dust suppression (water- or chemical-based) and other erosion prevention measures would be used for minimizing the environmental impacts during construction.
Time until protection is achieved	▪ The proposed remedial action and institutional controls could be implemented in approximately 1 year.

Table F-13. Implementability Evaluation Summary – Alternative 3

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ In-place containment with soil covers of contaminated soils could be easily constructed; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect human receptors and the environment from release of asbestos fibers and to meet ARARs. ■ Traffic control measures would be required due the site's proximity to Hwy 37. ■ Implementation of institutional controls and monitoring can be accomplished using available materials, equipment, and labor resources. ■ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1. ■ Monitoring at the site can be implemented with relative ease and available resources.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ In-place containment of contaminated soils with soil covers could be easily constructed using available technology. ■ Suitable uncontaminated materials for soil cover construction are not available onsite. Soil cover construction materials would be required from offsite sources outside of the Libby valley which could delay the schedule. ■ Soil and riprap placement along the river could be reliably performed using available technology; however unforeseen weather conditions (especially high river stages) could potentially cause schedule delays. ■ Implementation of monitoring is relatively straightforward to implement and reliably operate. ■ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1. Difficulties with institutional controls should not lead to potential schedule delays..
	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional soil cover or other remedial actions such as additional soil removal could be implemented with ease if required in the future. ■ Durable cover surfaces such as concrete for high intensity traffic areas could be more difficult to remove in the future if necessary than the soil covers.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	■ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of the cover systems. ■ Inspection, maintenance, and replacement of the soil cover systems and erosion control systems (i.e. riprap) along the river could be easily implemented using available materials, equipment, and labor resources. ■ Implementation of monitoring is easily implemented. ■ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used. ■ Frequent/periodic monitoring (inspections) would be required to monitor effectiveness of the remedy and detect cover system failures. ■ If covers are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air).

Table F-13. Implementability Evaluation Summary – Alternative 3 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	▪ Temporary relocation of personnel stationed in the search and rescue building may be required during construction, which would require some coordination with David Thompson Search and Rescue. ▪ Temporary measures around the water pump may be required, which would require some coordination with the City of Libby. ▪ Regulatory approval for in-place containment of contaminated soils using covers should be obtainable. ▪ Regulatory approvals for monitoring should be obtainable. ▪ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	▪ Use of offsite borrow sources outside of the Libby valley for cover materials would require coordination and approval.
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	▪ This alternative does not require treatment, storage and disposal services; thus, this criterion is not applicable.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	▪ The property for implementing the remedial action has already been obtained. ▪ Labor, equipment and material for cover construction are available. ▪ Suitable cover construction materials would be required from offsite sources outside of the Libby valley but are available. ▪ A large volume of suitable cover construction material from offsite sources would be required. ▪ Total volume of suitable soil cover material required is approximately 32,600 cubic yards; approximately 1,200 truck loads would be required to haul in the suitable material. ▪ Materials, equipment and labor resources used for institutional controls and monitoring are easily obtainable. ▪ Technical specialists and equipment are available for implementation of the remedy.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table F-14. Cost Evaluation Summary – Alternative 3

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	$2,923,000
Total Annual O&M Cost	$1,276,000
Total Periodic Cost	$355,000
Total Present Value Cost	$3,371,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Table F-15. Evaluation Summary for Overall Protection of Human Health and the Environment – Alternative 4

Evaluation Factors for Overall Protection of Human Health and the Environment	Evaluation Summary
Adequate protection of human health and the environment (short- and long-term) from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site	■ All contaminated surface soils at OU1 site are addressed through removal and disposal at the Former Libby Vermiculite Mine. ■ All contaminated surface soils would be removed and disposed at the Former Libby Vermiculite Mine and excavations would be backfilled with clean soil to eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air). ■ Removal and offsite disposal of contaminated soils and backfilling excavations with clean soil would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Offsite transportation and disposal of contaminated soils and transport of clean soils for backfilling excavations would pose short-term risks to the community and the environment. These risks would be mitigated through controls such as dust suppression (water- or chemical-based) and safe transportation procedures during implementation. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. □ Long-term effectiveness and permanence of the backfilled excavations and riprap is dependent on periodic inspection and O&M. ■ Long-term protection to human health and environment is not ensured since contaminated soils potentially posing a risk are left on site beneath the backfilled areas; if then backfilled areas are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the backfilled areas and riprap. □ Long-term effectiveness and permanence of the remedy is dependent on administrative and legal enforcement of the institutional controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the backfilled areas for integrity and adherence to institutional controls. ■ PRAOs are addressed under this alternative through removal and offsite disposal of contaminated soils, placement of clean backfill in excavations, institutional controls, and monitoring.

Table F-16. Evaluation Summary for Compliance with ARARs – Alternative 4

Evaluation Factors for Compliance with ARARs	Evaluation Summary
Compliance with Chemical-Specific ARARs	■ Removal and offsite disposal of contaminated soils coupled with backfilling of excavations with clean soil would physically address contaminant sources and prevent discharges of asbestos fibers to air, thus meeting visible emissions requirements of NESHAP and chemical-specific ARARs for air.
Compliance with Location-Specific ARARs	□ Location-specific ARARs for the remedy would be addressed during implementation of the remedial action.
Compliance with Action-Specific ARARs	□ Action-specific ARARs for the remedy would be addressed during implementation of the remedial action. □ Specifically, the cover requirements specified under NESHAP (40 CFR 61.151) are a potential consideration since contaminated soils would remain under the backfilled excavations.

Table F-17. Evaluation Summary for Long-Term Effectiveness and Permanence – Alternative 4

Evaluation Factors for Long-Term Effectiveness and Permanence	Evaluation Summary
Magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities	■ Removal of contaminated soils with offsite disposal at the Former Libby Vermiculite Mine and backfilling with clean soil would eliminate continued release and migration of asbestos fibers to unimpacted media (primarily soil and air) and would eliminate inhalation exposure risks from asbestos fibers to human receptors. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. ■ Long-term effectiveness and permanence of the backfilled areas and riprap is dependent on periodic inspection and O&M. ■ Long-term protection to human health and environment is not ensured since contaminated soils potentially posing a risk are left on site beneath the backfilled areas; if backfilled areas are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air). ■ Institutional controls would be implemented to prevent unacceptable uses of the site by human receptors which could impact effectiveness of the backfilled areas and riprap. □ Long-term effectiveness and permanence of the institutional controls is dependent on administrative and legal enforcement of the controls. ■ Monitoring would be required for effectiveness of the remedy through periodic inspections of the backfilled areas for integrity and adherence to institutional controls.
Adequacy and reliability of controls that are used to manage treatment residuals and untreated waste remaining at the site.	■ Removal and offsite disposal of contaminated soils coupled with backfilling excavation with clean soil are a reliable control if properly maintained. ■ Long-term effectiveness and permanence is not entirely ensured since contaminated soils potentially posing a risk are left on site beneath the backfilled areas. ■ Riprap protection would be provided as needed along the riverbank for protecting of the remedy put in place and to prevent the erosion of underlying contaminated soils. ■ Long-term effectiveness and permanence of the backfilled areas and riprap is dependent on periodic inspection and O&M to repair erosion or other damage to the backfilled areas and riprap. ■ Although institutional controls will be implemented, adequacy and reliability of institituional controls is dependent on administrative and legal enforcement of the controls. □ Monitoring would be required for effectiveness of the remedy through periodic inspections of the cover for integrity and adherence to institutional controls.

Table F-18. Evaluation Summary for Reduction of Toxicity, Mobility, or Volume through Treatment – Alternative 4

Evaluation Factors for Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluation Summary
The treatment processes, the alternative uses, and materials they will treat	☐ This alternative does not treat the contaminated soils; thus there is no reduction of toxicity, mobility, or volume of contamination through treatment. ☐ The statutory preference for treatment as a principal element of the remedial action is not met.
The amount of hazardous substances, pollutants, or contaminants that will be destroyed or treated, including how the principal threat(s) will be addressed	
The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment	
The degree to which the treatment is irreversible	
The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate such hazardous substances and their constituents	
Whether the alternative would satisfy the statutory preference for treatment as a principal element of the remedial action	

Table F-19. Short-Term Effectiveness Evaluation Summary – Alternative 4

Evaluation Factors for Short-Term Effectiveness	Evaluation Summary
Short-term risks that might be posed to the community during implementation of an alternative	□ The alternative involves disturbance of contaminated soils, which could pose short-term risks to the community living close to the site boundary, employees at the search and resuce building, and park visitors from inhalation of asbestos fibers. ■ Offsite transportation and disposal of contaminated soils at the Former Libby Vermiculite Mine would pose short-term risks to the community. ■ There would be additional short-term impacts to the community under this alternative as compared to Alternative 3, as additional truck traffic would be required for offsite disposal of contaminated soils as well as transport of clean backfill soils. □ Safety measures such as dust suppression and establishment of work zones (such as exclusion zones) would be implemented during construction to reduce short-term exposure risks to the community. □ Temporary relocation of workers associated with Search and Rescue Building may be required during construction. □ Partial or full closure of Riverside Park would be required during construction. □ Short-term risks posed to the community during implementation of the alternative after implementing protective controls and measures mainly relate to trespassers within the exclusion zone.
Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures	□ The alternative involves disturbance of contaminated soils, which could pose short-term risks to workers from inhalation of asbestos fibers. □ Safety measures such as dust suppression, use of PPE, and establishment of work zones would protect workers during implementation. □ Other potential impacts can be from safety hazards during remedial implementation, such as falls, electrical hazards, and mechanical hazards. □ These other potential impacts would be mitigate through adherence to safety requirements and standard operating procedures.
Potential adverse environmental impacts resulting from construction and implementation of an alternative and the reliability of the available mitigation measures during implementation in preventing or reducing the potential impacts	■ There would be additional short-term impacts to the environment under this alternative as compared to Alternative 3, as contaminated soils would be transported and disposed of offsite at the Former Libby Vermiculite Mine. ■ Use of standard procedures for transport and handling of contaminated soils at the mine would mitigate risks to the environment. □ Short-term impacts to the Kootenai River could occur during implementation, especially along the riverbank. □ Protective measures, such as dust suppression (water- or chemical-based) and other erosion prevention measures would be used for minimizing the environmental impacts during construction.
Time until protection is achieved	■ The proposed remedial action and institutional controls could be implemented in approximately 1 year, though not as easily as for Alternative 3.

Table F-20. Implementability Evaluation Summary – Alternative 4

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility	Technical difficulties and unknowns associated with the construction and operation of a technology	■ Removal and offsite disposal of contaminated soils coupled with backfilling of excavations could be easily constructed; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect human receptors and the environment from release of asbestos fibers and to meet ARARs. ■ Removal and disposal of contaminated soils at the Former Libby Vermiculite Mine could be easily implemented; however, source control measures, such as dust suppression (water- or chemical-based) and PPE, would be required to protect receptors and the environment from release of asbestos fibers and meet ARARs. ■ Removed contaminated soils would require transportation to the mine in enclosed trucks to minimize the exposure risks from asbestos fibers to the community. □ Traffic control measures at the site would be required due to the site's proximity to Hwy 37. ■ Large volume of contaminated soils need to be transported offsite for disposal. ■ Total volume to be excavated and transported offsite for disposal is approximately 24,400 cubic yards. ■ Approximately 880 truck loads would be required to haul the entire excavated volume of contaminated soils. ■ Logistics for working with large number of heavy equipment onsite and offsite transportation may be difficult to manage. ■ Excavation and backfilling around the onsite structures, utilities, and buildings may be challenging. □ Implementation of institutional controls and monitoring can be accomplished using available materials, equipment, and labor resources. □ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1. □ Monitoring at the site can be implemented with relative ease and available resources.
	Reliability of the technology, focusing on technical problems that will lead to schedule delays	■ Removal and disposal of contaminated soils could be easily implemented using the available technology. ■ Suitable uncontaminated materials for backfilling of excavations are not available onsite. Backfill materials would be required from offsite sources outside of the Libby valley which might delay the schedule. ■ A large volume of suitable backfilling material would be required, which might delay the schedule. □ Soil and riprap placement along the river could be reliably performed using available technology; however unforeseen weather conditions (especially high river stages) could potentially cause schedule delays. □ Implementation of monitoring is relatively straightforward to implement and reliably operate. □ Implementation of institutional controls should be straightforward to implement but is dependent on the types of administrative and/or legal instruments proposed for OU1. Difficulties with institutional controls should not lead to potential schedule delays.

Table F-20. Implementability Evaluation Summary – Alternative 4 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Technical Feasibility - continued	Ease of undertaking additional remedial actions, including what, if any, future remedial actions would be needed and the difficulty to implement additional remedial actions	■ Placing additional backfill material or other remedial actions such as additional soil removal could be implemented with ease if required in the future. ■ Durable surfaces such as concrete for high intensity traffic areas could be more difficult to remove in the future if necessary than the soil backfills areas.
	Ability to monitor the effectiveness of the remedy, including an evaluation of risks of exposure should monitoring be insufficient to detect a system failure	□ A comprehensive inspection, monitoring, and maintenance program would be implemented to maintain the integrity of the backfilled areas. □ Contaminated soils place at the mine would be monitored as part of that OU. □ Inspection, maintenance, and replacement of the backfilled areas and erosion control systems (i.e. riprap) along the river could be easily implemented using available materials, equipment, and labor resources. □ Implementation of monitoring is easily implemented. □ Modifications to the institutional controls can be implemented; monitoring of institutional controls is dependent on periodic reviews of the administrative and/or legal instruments used. □ Frequent/periodic monitoring (jnspections) would be required to monitor effectiveness of the remedy and detect failures of backfilled areas. □ If backfilled areas are compromised the contaminated soils could allow continued release and of asbestos fibers to unimpacted media (primarily soil and air).
Administrative Feasibility	Activities needed to coordinate with other offices and agencies	■ Temporary relocation of personnel stationed in the search and rescue building may be required during construction, which would require some coordination with David Thompson Search and Rescue. ■ Temporary measures around the water pump may be required, which would require some coordination with the City of Libby. ■ Utilities (if any) affected by excavation of contaminated soils would require coordination with the affected utility company. ■ Regulatory approval for excavation and offsite transport of contaminated soils should be obtainable. ■ Regulatory approvals for monitoring should be obtainable. ■ Regulatory approvals for institutional controls should be obtainable; however, some difficulties may be encountered with regard to types of restrictions implemented.
	The ability and time required to obtain any necessary approvals and permits from other agencies (for offsite actions)	■ Regulatory and facility approvals for offsite disposal at the Former Libby Vermiculite Mine are already obtained. ■ Use of existing offsite borrow source for backfill materials would require coordination and approval.

Table F-20. Implementability Evaluation Summary – Alternative 4 (continued)

Evaluation Factors for Implementability		Evaluation Summary
Availability of Services and Materials	Availability of adequate offsite treatment, storage capacity, and disposal capacity and services	■ The Former Libby Vermiculite Mine has sufficient capacity to accept all of the contaminated soils from the OU1 site. ■ Use of offsite borrow sources outside of the Libby valley for backfill materials would require coordination and approval.
	Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources	□ The property for implementing the remedial action has already been obtained. □ Labor, equipment and material for removal of contaminated soil and clean soil backfilling are available. ■ Suitable backfill construction materials would be required from offsite sources outside of the Libby valley but are available. ■ A large volume of suitable backfill material from offsite sources would be required. ■ Total volume of suitable soil backfill material required is approximately 20,400 cy; approximately 730 truck loads would be required to haul in the suitable material. □ Materials, equipment and labor resources used for institutional controls and monitoring are easily obtainable. □ Technical specialists and equipment are available for implementation of the remedy.
	Availability of services and materials plus the potential for obtaining competitive bids, which is particularly important for innovative technologies	
	Availability of prospective technologies	

Table F-21. Cost Evaluation Summary – Alternative 4

Evaluation Factors for Cost	Approx. Cost (Dollars)
Total Capital Cost	$3,910,000
Total Annual O&M Cost	$1,276,000
Total Periodic Cost	$355,000
Total Present Value Cost	$4,294,000

Note: Total costs are for the assumed period of evaluation (Years 0 through 30). Costs are rounded to the nearest $1,000.

Appendix G

Detailed Alternative Analysis Cost Information

The cost spreadsheets included in this appendix were developed in accordance with EPA 540-R-00-002 (OSWER 9355.0-75) July 2000.

These costs should be used to compare alternative relative costs. Costs for project management, remedial design, and construction management were determined as percentages of capital cost per the guidance. Costs for these work items may not reflect costs for implementation. These costs are determined based on specific client requirements during implementation.

Present Value and Cost Estimate Summary

Alternative 1

No Action

TABLE PV-1

PRESENT VALUE ANALYSIS

Alternative 1
No Action

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs[2]	Annual O&M Costs	Periodic Costs (Five Year Site Reviews)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	1.0000	$0
1	$0	$0	$0	$0	0.9346	$0
2	$0	$0	$0	$0	0.8734	$0
3	$0	$0	$0	$0	0.8163	$0
4	$0	$0	$0	$0	0.7629	$0
5	$0	$0	$71,000	$71,000	0.7130	$50,623
6	$0	$0	$0	$0	0.6663	$0
7	$0	$0	$0	$0	0.6227	$0
8	$0	$0	$0	$0	0.5820	$0
9	$0	$0	$0	$0	0.5439	$0
10	$0	$0	$71,000	$71,000	0.5083	$36,089
11	$0	$0	$0	$0	0.4751	$0
12	$0	$0	$0	$0	0.4440	$0
13	$0	$0	$0	$0	0.4150	$0
14	$0	$0	$0	$0	0.3878	$0
15	$0	$0	$71,000	$71,000	0.3624	$25,730
16	$0	$0	$0	$0	0.3387	$0
17	$0	$0	$0	$0	0.3166	$0
18	$0	$0	$0	$0	0.2959	$0
19	$0	$0	$0	$0	0.2765	$0
20	$0	$0	$71,000	$71,000	0.2584	$18,346
21	$0	$0	$0	$0	0.2415	$0
22	$0	$0	$0	$0	0.2257	$0
23	$0	$0	$0	$0	0.2109	$0
24	$0	$0	$0	$0	0.1971	$0
25	$0	$0	$71,000	$71,000	0.1842	$13,078
26	$0	$0	$0	$0	0.1722	$0
27	$0	$0	$0	$0	0.1609	$0
28	$0	$0	$0	$0	0.1504	$0
29	$0	$0	$0	$0	0.1406	$0
30	$0	$0	$71,000	$71,000	0.1314	$9,329
TOTALS:	$0	$0	$426,000	**$426,000**		$153,195
TOTAL PRESENT VALUE OF ALTERNATIVE 1 [5]						**$153,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-1.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083	36	0.0875
11	0.4751	37	0.0818
12	0.4440	38	0.0765
13	0.4150	39	0.0715
14	0.3878	40	0.0668
15	0.3624	41	0.0624
16	0.3387	42	0.0583
17	0.3166	43	0.0545
18	0.2959	44	0.0509
19	0.2765	45	0.0476
20	0.2584	46	0.0445
21	0.2415	47	0.0416
22	0.2257	48	0.0389
23	0.2109	49	0.0363
24	0.1971	50	0.0339
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-1

Alternative 1
No Action

COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: *Draft Feasibility Study*
Base Year: 2008
Date: May 22, 2008

Description: Alternative 1 (No Action) is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as a baseline for comparison against other remedial alternatives. This alternative would discontinue all current remedial activities and no further action would be initiated at the site to address the contaminated soils or otherwise mitigate the associated risks to human health or the environment. Five-year site reviews would be performed as required by the NCP to evaluate whether adequate protection of human health and the environment is provided. Site inspection along with ambient air monitoring would be performed as necessary to complete the 5-year site reviews. The No Action alternative provides an environmental baseline against which impacts of the various remedial alternatives can be compared.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 5, 10, 15, 20, 25 and 30)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW1-1	1	LS	$32,055	$32,055	Includes 5-yrear site inspection and report
Community Awareness Activities	CW1-2	1	LS	$14,985	$14,985	
SUBTOTAL					$47,040	
Contingency (Scope and Bid)		20%			$9,408	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$56,448	
Project Management		10%			$5,645	The high end of the recommended range was used.
Technical Support		15%			$8,467	Middle value of the recommended range was used.
TOTAL					$70,560	
TOTAL PERIODIC COST					**$71,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

EA	Each
QTY	Quantity
LS	Lump Sum

Present Value and Cost Estimate Summary

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

TABLE PV-3

PRESENT VALUE ANALYSIS

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Year[1]	Capital Costs (Institutional Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Cover Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews and Monitoring)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$58,000	$2,865,000	$0	$0	$2,923,000	0.9346	$2,731,836
2	$0	$0	$44,000	$0	$44,000	0.8734	$38,430
3	$0	$0	$44,000	$0	$44,000	0.8163	$35,917
4	$0	$0	$44,000	$0	$44,000	0.7629	$33,568
5	$0	$0	$44,000	$0	$44,000	0.7130	$31,372
6	$0	$0	$44,000	$71,000	$115,000	0.6663	$76,625
7	$0	$0	$44,000	$0	$44,000	0.6227	$27,399
8	$0	$0	$44,000	$0	$44,000	0.5820	$25,608
9	$0	$0	$44,000	$0	$44,000	0.5439	$23,932
10	$0	$0	$44,000	$0	$44,000	0.5083	$22,365
11	$0	$0	$44,000	$71,000	$115,000	0.4751	$54,637
12	$0	$0	$44,000	$0	$44,000	0.4440	$19,536
13	$0	$0	$44,000	$0	$44,000	0.4150	$18,260
14	$0	$0	$44,000	$0	$44,000	0.3878	$17,063
15	$0	$0	$44,000	$0	$44,000	0.3624	$15,946
16	$0	$0	$44,000	$71,000	$115,000	0.3387	$38,951
17	$0	$0	$44,000	$0	$44,000	0.3166	$13,930
18	$0	$0	$44,000	$0	$44,000	0.2959	$13,020
19	$0	$0	$44,000	$0	$44,000	0.2765	$12,166
20	$0	$0	$44,000	$0	$44,000	0.2584	$11,370
21	$0	$0	$44,000	$71,000	$115,000	0.2415	$27,773
22	$0	$0	$44,000	$0	$44,000	0.2257	$9,931
23	$0	$0	$44,000	$0	$44,000	0.2109	$9,280
24	$0	$0	$44,000	$0	$44,000	0.1971	$8,672
25	$0	$0	$44,000	$0	$44,000	0.1842	$8,105
26	$0	$0	$44,000	$71,000	$115,000	0.1722	$19,803
27	$0	$0	$44,000	$0	$44,000	0.1609	$7,080
28	$0	$0	$44,000	$0	$44,000	0.1504	$6,618
29	$0	$0	$44,000	$0	$44,000	0.1406	$6,186
30	$0	$0	$44,000	$0	$44,000	0.1314	$5,782
TOTALS:	$58,000	$2,865,000	$1,276,000	$355,000	$4,554,000		$3,371,161
TOTAL PRESENT VALUE OF ALTERNATIVE 3[5]							**$3,371,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-3.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083	36	0.0875
11	0.4751	37	0.0818
12	0.4440	38	0.0765
13	0.4150	39	0.0715
14	0.3878	40	0.0668
15	0.3624	41	0.0624
16	0.3387	42	0.0583
17	0.3166	43	0.0545
18	0.2959	44	0.0509
19	0.2765	45	0.0476
20	0.2584	46	0.0445
21	0.2415	47	0.0416
22	0.2257	48	0.0389
23	0.2109	49	0.0363
24	0.1971	50	0.0339
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-3

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

Description: Alternative 3 uses a remedial strategy that emphasizes complete in-place containment of contaminated soils (Area 1 - Former Export Plant and Area 2 - Riverside Park) of the OU1 site to achieve protectiveness of human health and the environment. In-place containment would be implemented using an exposure barrier (cover) constructed from a variety of materials, depending on the location and anticipated future uses. Institutional Controls would be implemented, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the cover system. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW3-1	1	LS	$30,356	$30,356	
SUBTOTAL					$30,356	
Contingency (Scope and Bid)		20%			$6,071	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$36,427	
Project Management		10%			$3,643	Percentage from Exhibit 5-8 was used.
Remedial Design		20%			$7,285	Percentage from Exhibit 5-8 was used.
Construction Management		15%			$5,464	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$5,464	Middle value of the recommended range was used.
TOTAL					$58,283	
TOTAL CAPITAL COST					**$58,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Years 1

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW3-5	1	LS	$22,127	$22,127	
Mobilization/Demobilization	CW3-9	1	EA	$26,829	$26,829	
Temporary Laydown Area Placement	CW3-4	1	LS	$7,275	$7,275	
Borrow Material Sampling	CW3-13	1	LS	$2,113	$2,113	
Construction of Soil Cover and Riverbank Stabilization	CW3-6	1	LS	$772,353	$772,353	
Softscape Installation Over Soil Cover	CW3-7A	1	LS	$161,889	$161,889	
Hardscape Installation Over Soil Cover	CW3-7B	1	LS	$573,855	$573,855	
Resurfacing of City Service Road	CW3-8	1	LS	$116,543	$116,543	
Surveying for Site Construction Control	CW3-10	1	LS	$11,315	$11,315	
Equipment Decontamination	CW3-11	1	LS	$13,798	$13,798	
Site Maintenance During Construction	CW3-12	1	YR	$73,606	$73,606	
SUBTOTAL					$1,781,703	
Contingency (Scope and Bid)		20%			$356,341	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$2,138,044	
Project Management		5%			$106,902	Percentage from Exhibit 5-8 was used.
Remedial Design		8%			$171,044	Percentage from Exhibit 5-8 was used.
Construction Management		6%			$128,283	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$320,707	Middle value of the recommended range was used.
TOTAL					$2,864,980	
TOTAL CAPITAL COST					**$2,865,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-3

Alternative 3

In-Place Containment of Contaminated Soils in Area 1 and Area 2, Institutional Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

Description: Alternative 3 uses a remedial strategy that emphasizes complete in-place containment of contaminated soils (Area 1 - Former Export Plant and Area 2 - Riverside Park) of the OU1 site to achieve protectiveness of human health and the environment. In-place containment would be implemented using an exposure barrier (cover) constructed from a variety of materials, depending on the location and anticipated future uses. Institutional Controls would be implemented, which include a combination of institutional controls, such as community awareness and land use restrictions. Long-term O&M would be implemented as necessary to maintain the integrity of the cover system. Five-year site reviews would be performed to evaluate whether adequate protection of human health and the environment is provided. Inspections and monitoring would be performed as necessary.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 2 through 30

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Cover and Erosion Controls O&M	CW3-3A	1	LS	$20,587	$20,587	Includes labor for cover, and remedy maintenance
Annual Site Inspection	CW3-3B	1	LS	$5,705	$5,705	Includes annual site inspection
SUBTOTAL					$26,292	
Contingency (Scope and Bid)		20%			$5,258	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$31,550	
Project Management		10%			$3,155	Percentage from Exhibit 5-8 was used.
Construction Management		15%			$4,733	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$4,733	Middle value of the recommended range was used.
TOTAL					$44,171	
TOTAL ANNUAL O&M COST					**$44,000**	Total O&M cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 6, 11, 16, 21, and 26)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW3-2	1	LS	$32,055	$32,055	Includes 5-year site inspection and report
Community Awareness Activities	CW3-14	1	LS	$14,985	$14,985	
SUBTOTAL					$47,040	
Contingency (Scope and Bid)		20%			$9,408	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$56,448	
Project Management		10%			$5,645	The high end of the recommended range was used.
Technical Support		15%			$8,467	Middle value of the recommended range was used.
TOTAL					$70,560	
TOTAL PERIODIC COST					**$71,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
EA	Each
LS	Lump Sum
QTY	Quantity
YR	Year

Present Value and Cost Estimate Summary

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

TABLE PV-4

PRESENT VALUE ANALYSIS

Alternative 4

Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

Site:	**OU1 - Former Export Plant**
Location:	**Libby, Montana**
Phase:	**Draft Feasibility Study**
Base Year:	**2008**

Year[1]	Capital Costs (Institutional Controls)[2]	Capital Costs (Earthwork)[2]	Annual O&M Costs (Remedy Maintenance and Inspection)	Periodic Costs (Five-Year Site Reviews & Monitoring)	Total Annual Expenditure[3]	Discount Factor (7.0%)	Present Value[4]
0	$0	$0	$0	$0	$0	1.0000	$0
1	$58,000	$3,852,000	$0	$0	$3,910,000	0.9346	$3,654,286
2	$0	$0	$44,000	$0	$44,000	0.8734	$38,430
3	$0	$0	$44,000	$0	$44,000	0.8163	$35,917
4	$0	$0	$44,000	$0	$44,000	0.7629	$33,568
5	$0	$0	$44,000	$0	$44,000	0.7130	$31,372
6	$0	$0	$44,000	$71,000	$115,000	0.6663	$76,625
7	$0	$0	$44,000	$0	$44,000	0.6227	$27,399
8	$0	$0	$44,000	$0	$44,000	0.5820	$25,608
9	$0	$0	$44,000	$0	$44,000	0.5439	$23,932
10	$0	$0	$44,000	$0	$44,000	0.5083	$22,365
11	$0	$0	$44,000	$71,000	$115,000	0.4751	$54,637
12	$0	$0	$44,000	$0	$44,000	0.4440	$19,536
13	$0	$0	$44,000	$0	$44,000	0.4150	$18,260
14	$0	$0	$44,000	$0	$44,000	0.3878	$17,063
15	$0	$0	$44,000	$0	$44,000	0.3624	$15,946
16	$0	$0	$44,000	$71,000	$115,000	0.3387	$38,951
17	$0	$0	$44,000	$0	$44,000	0.3166	$13,930
18	$0	$0	$44,000	$0	$44,000	0.2959	$13,020
19	$0	$0	$44,000	$0	$44,000	0.2765	$12,166
20	$0	$0	$44,000	$0	$44,000	0.2584	$11,370
21	$0	$0	$44,000	$71,000	$115,000	0.2415	$27,773
22	$0	$0	$44,000	$0	$44,000	0.2257	$9,931
23	$0	$0	$44,000	$0	$44,000	0.2109	$9,280
24	$0	$0	$44,000	$0	$44,000	0.1971	$8,672
25	$0	$0	$44,000	$0	$44,000	0.1842	$8,105
26	$0	$0	$44,000	$71,000	$115,000	0.1722	$19,803
27	$0	$0	$44,000	$0	$44,000	0.1609	$7,080
28	$0	$0	$44,000	$0	$44,000	0.1504	$6,618
29	$0	$0	$44,000	$0	$44,000	0.1406	$6,186
30	$0	$0	$44,000	$0	$44,000	0.1314	$5,782
TOTALS:	$58,000	$3,852,000	$1,276,000	$355,000	$5,541,000		$4,293,611
TOTAL PRESENT VALUE OF ALTERNATIVE 4[5]							**$4,294,000**

Notes:

[1] Duration is assumed to be 30 years for present value analysis.

[2] Capital costs, for purposes of this analysis, are assumed to be distributed as indicated on Table CS-4.

[3] Total annual expenditure is the total cost per year with no discounting.

[4] Present value is the total cost per year including a 7.0% discount factor for that year. See Table PV-ADRIFT for details.

[5] Total present value is rounded to the nearest $1,000. Inflation and depreciation are excluded from the present value cost.

TABLE PV-ADRFT

PRESENT VALUE ANALYSIS

Annual Discount Rate Factors Table

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Discount Rate (Percent): 7.0

Year	Discount Factor[1,2]	Year	Discount Factor[1,2]
0	1.0000	26	0.1722
1	0.9346	27	0.1609
2	0.8734	28	0.1504
3	0.8163	29	0.1406
4	0.7629	30	0.1314
5	0.7130	31	0.1228
6	0.6663	32	0.1147
7	0.6227	33	0.1072
8	0.5820	34	0.1002
9	0.5439	35	0.0937
10	0.5083	36	0.0875
11	0.4751	37	0.0818
12	0.4440	38	0.0765
13	0.4150	39	0.0715
14	0.3878	40	0.0668
15	0.3624	41	0.0624
16	0.3387	42	0.0583
17	0.3166	43	0.0545
18	0.2959	44	0.0509
19	0.2765	45	0.0476
20	0.2584	46	0.0445
21	0.2415	47	0.0416
22	0.2257	48	0.0389
23	0.2109	49	0.0363
24	0.1971	50	0.0339
25	0.1842		

Notes:

[1] Annual discount factors were calculated using the formulas and guidance presented in Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

[2] The real discount rate of 7.0% was obtained from "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000, Page 4-5.

TABLE CS-4

Alternative 4
Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

Description: Alternative 4 uses a remedial strategy that emphasizes on complete removal of contaminated soils (Area 1 - Former Export Plant and Area 2 - Riverside Park) and offsite disposal of the removed soils at the former Libby vermiculite mine and would achieve protectiveness of human health and the environment. Excavated areas will be backfilled with uncontaminated material. Sampling and analysis would be conducted to ensure protectiveness of the remedy. Long-term O&M activities, institutional controls, and 5-year site reviews would be required under this alternative.

INSTITUTIONAL AND ENGINEERED CONTROLS CAPITAL COSTS: (Assumed to be Incurred During Year 1

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Institutional Controls	CW4-1	1	LS	$30,356	$30,356	
SUBTOTAL					$30,356	
Contingency (Scope and Bid)		20%			$6,071	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$36,427	
Project Management		10%			$3,643	Percentage from Exhibit 5-8 was used.
Remedial Design		20%			$7,285	Percentage from Exhibit 5-8 was used.
Construction Management		15%			$5,464	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$5,464	Middle value of the recommended range was used.
TOTAL					$58,283	
TOTAL CAPITAL COST					**$58,000**	Total capital cost is rounded to the nearest $1,000.

EARTHWORK CAPITAL COSTS: (Assumed to be Incurred During Years 1

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Site Clearing and Grubbing	CW4-4	1	LS	$22,127	$22,127	
Mobilization/Demobilization	CW4-10	1	EA	$31,697	$31,697	
Temporary Laydown and Access Road Installation	CW4-3	1	LS	$7,275	$7,275	
Contaminated Soils Removal	CW4-5	1	LS	$222,097	$222,097	
Disposal of Excavated Contaminated Soils	CW4-6	1	LS	$518,949	$518,949	
Removal Confirmation Soil Sampling	CW4-16	1	LS	$8,276	$8,276	
Borrow Material Sampling	CW4-2A	1	LS	$2,053	$2,053	
Backfilling and Riverbank Stabilization	CW4-7	1	LS	$612,023	$612,023	
Softscape Installation Over Soil Cover	CW4-8	1	LS	$161,889	$161,889	
Hardscape Installation Over Soil Cover	CW4-9	1	LS	$573,855	$573,855	
Resurfacing of City Service Road (Outside the OU1 Site Boundary)	CW4-15	1	LS	$116,543	$116,543	
Surveying for Site Construction Control	CW4-11	1	LS	$11,315	$11,315	
Equipment Decontamination	CW4-12	1	LS	$16,507	$16,507	
Site Maintenance During Construction	CW4-13	1	YR	$90,849	$90,849	
SUBTOTAL					$2,395,455	
Contingency (Scope and Bid)		20%			$479,091	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$2,874,546	
Project Management		5%			$143,727	Percentage from Exhibit 5-8 was used.
Remedial Design		8%			$229,964	Percentage from Exhibit 5-8 was used.
Construction Management		6%			$172,473	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$431,182	Middle value of the recommended range was used.
TOTAL					$3,851,892	
TOTAL CAPITAL COST					**$3,852,000**	Total capital cost is rounded to the nearest $1,000.

TABLE CS-4

Alternative 4
Removal of Contaminated Soils in Area 1 and Area 2 and Offsite Disposal at the Former Libby Vermiculite Mine and Institutional Controls with Monitoring

COST ESTIMATE SUMMARY

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008
Date: May 22, 2008

Description: Alternative 4 uses a remedial strategy that emphasizes on complete removal of contaminated soils (Area 1 - Former Export Plant and Area 2 - Riverside Park) and offsite disposal of the removed soils at the former Libby vermiculite mine and would achieve protectiveness of human health and the environment. Excavated areas will be backfilled with uncontaminated material. Sampling and analysis would be conducted to ensure protectiveness of the remedy. Long-term O&M activities, institutional controls, and 5-year site reviews would be required under this alternative.

ANNUAL OPERATIONS AND MAINTENANCE (O&M) (Years 2 through 30

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
Backfill and Erosion Controls O&M	CW4-14A	1	YR	$20,587	$20,587	Includes labor for cover, and remedy maintenance
Annual Site Inspection	CW4-14B	1	YR	$5,705	$5,705	Includes annual site inspection
SUBTOTAL					$26,292	
Contingency (Scope and Bid)		20%			$5,258	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$31,550	
Project Management		10%			$3,155	Percentage from Exhibit 5-8 was used.
Construction Management		15%			$4,733	Percentage from Exhibit 5-8 was used.
Technical Support		15%			$4,733	Middle value of the recommended range was used.
TOTAL					$44,171	
TOTAL ANNUAL O&M COST					**$44,000**	Total O&M cost is rounded to the nearest $1,000.

5-YEAR SITE REVIEW PERIODIC COSTS (Years 6, 11, 16, 21, and 26)

DESCRIPTION	WORKSHEET	QTY	UNIT(S)	UNIT COST	TOTAL	NOTES
5-Year Site Reviews	CW4-2C	1	LS	$32,055	$32,055	Includes 5-year site inspection and report
Community Awareness Activities	CW4-2B	1	LS	$14,985	$14,985	
SUBTOTAL					$47,040	
Contingency (Scope and Bid)		20%			$9,408	10% Scope, 10% Bid (Low end of the recommended range).
SUBTOTAL					$56,448	
Project Management		10%			$5,645	The high end of the recommended range was used.
Technical Support		15%			$8,467	Middle value of the recommended range was used.
TOTAL					$70,560	
TOTAL PERIODIC COST					**$71,000**	Total capital cost is rounded to the nearest $1,000.

Notes:
Percentages used for indirect costs are based on guidance from Section 5.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000.

Abbreviations:

ABS	Activity Based Sampling
EA	Each
LS	Lump Sum
QTY	Quantity
YR	Year

Cost Worksheets

Alternative 1

TABLE CW1-1

Alternative 1 **Cost Worksheet: CW1-1**
Capital Cost Sub-Element
5-Year Site Reviews

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/5/2008
Checked By: AL **Date:** 5/5/2008

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Site Inspection - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$807.77	$807.77	$807.77	8%	9%	$951	MII MII Assemblies	
M56	Per Diem for 2 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$258.00	0%	0%	$258	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$1,890.00	100%	9%	$4,120	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	120	HR	1.00	$28.86	$28.86	$0.00	$0.00	$0.00	$0.00	$28.86	$3,463.20	100%	9%	$7,550	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	160	HR	1.00	$29.28	$29.28	$0.00	$0.00	$0.00	$0.00	$29.28	$4,684.80	100%	9%	$10,213	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	24	HR	1.00	$39.73	$39.73	$0.00	$0.00	$0.00	$0.00	$39.73	$953.52	100%	9%	$2,079	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$24.11	$24.11	$0.00	$0.00	$0.00	$0.00	$24.11	$964.40	100%	9%	$2,102	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$20.44	$20.44	$0.00	$0.00	$0.00	$0.00	$20.44	$817.60	100%	9%	$1,782	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$32,055		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW1-2

Alternative 1
Capital Cost Sub-Element
Community Awareness Activities

Cost Worksheet: CW1-2

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/5/2008
Checked By: AL **Date:** 5/5/2008

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of Former Export Plant site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes meeting hall, publishing and sending notices or informational flyers and general overhead.

Cost Analysis:
Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	20	HR	1.00	$55.26	$55.26	$0.00	$0.00	$0.00	$0.00	$55.26	$1,105.20	100%	9%	$2,409	SE SalaryExpert.com	10 hrs per day, 2 days
L13	Project Manager	20	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$945.00	100%	9%	$2,060	SE SalaryExpert.com	10 hrs per day, 2 days
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$516.00	0%	0%	$516	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$10,000.00	0%	0%	$10,000	A Allowance	2 events per 5-yr review.
												TOTAL UNIT COST:			$14,985		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Cost Worksheets

Alternative 3

TABLE CW3-1

Alternative 3
Capital Cost Sub-Element
Institutional Controls

Cost Worksheet: CW3-1

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves implementation of institutional control for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish the site boundaries.

Cost Analysis:
Cost for Institutional Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L8	Environmental Lawyer	40	HR	1.00	$28.31	$28.31	$0.00	$0.00	$0.00	$0.00	$28.31	$1,132.40	100%	9%	$2,469	SE SalaryExpert.com	
L15	Paralegal	120	HR	1.00	$19.18	$19.18	$0.00	$0.00	$0.00	$0.00	$19.18	$2,301.60	100%	9%	$5,017	SE SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$20.44	$20.44	$0.00	$0.00	$0.00	$0.00	$20.44	$817.60	100%	9%	$1,782	SE SalaryExpert.com	
M11A	Document Submission and Recording Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
A38A	Site Survey - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$462.08	$462.08	$924.16	8%	9%	$1,088	MII MII Assemblies	To establish site boundary as needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$30,356		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-2

Alternative 3
Capital Cost Sub-Element
5-Year Site Reviews

Cost Worksheet: CW3-2

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Site Inspection - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$807.77	$807.77	$807.77	8%	9%	$951	MII Mll Assemblies	
M56	Per Diem for 2 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$258.00	0%	0%	$258	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$1,890.00	100%	9%	$4,120	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	120	HR	1.00	$28.86	$28.86	$0.00	$0.00	$0.00	$0.00	$28.86	$3,463.20	100%	9%	$7,550	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	160	HR	1.00	$29.28	$29.28	$0.00	$0.00	$0.00	$0.00	$29.28	$4,684.80	100%	9%	$10,213	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	24	HR	1.00	$39.73	$39.73	$0.00	$0.00	$0.00	$0.00	$39.73	$953.52	100%	9%	$2,078	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$24.11	$24.11	$0.00	$0.00	$0.00	$0.00	$24.11	$964.40	100%	9%	$2,102	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$20.44	$20.44	$0.00	$0.00	$0.00	$0.00	$20.44	$817.60	100%	9%	$1,782	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$32,055		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	Mll assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mll assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-3A

Alternative 3 **Cost Worksheet: CW3-3A**
Capital Cost Sub-Element
Cover and Erosion Controls O&M

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves the Cover and Erosion Controls O&M pertaining to the cover and erosion controls along the Kootenai river at the site. It includes costs for on-site labor, equipment, materials and allowances for maintenance.

Cost Analysis:
Cost for Cover and Erosion Controls O&M(Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$823.25	$823.25	$9,879.00	8%	9%	$11,630	MII MII Assemblies	1 days/month
M48A	Sod Maintenance Allowance	8.8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,200.00	8%	9%	$2,590	A Allowance	
M48B	Concrete Maintenance Allowance	4.4	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$450.00	$450.00	$1,980.00	8%	9%	$2,331	A Allowance	
M48	Weed Control Services Allowance	8.8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$880.00	8%	9%	$1,036	A Allowance	
M21B	Erosion Repair Material Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$20,587		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-3B

Alternative 3
Capital Cost Sub-Element
Annual Site Inspection

Cost Worksheet: CW3-3B

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves the Annual Site Inspection to inspect the integrity of the all the remedial components of the remedy put in place. It includes costs for on-site labor, equipment, materials.

Cost Analysis:
Cost for Annual Site Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Site Inspection - 2 Person Crew	6	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$807.77	$807.77	$4,848.62	8%	9%	$5,705	MII MII Assemblies	6 days/year
												TOTAL UNIT COST:			$5,705		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, *EM 1110-2-1304, Sep 2007.*
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	*Burdened Line Item Cost*	SY	*Square Yard*
		TN	Tons

TABLE CW3-4

Alternative 3 **Cost Worksheet: CW3-4**

Capital Cost Sub-Element

Temporary Laydown Area Placement

COST WORKSHEET

Site: OU1 - Former Export Plant

Location: Libby, Montana

Phase: Draft Feasibility Study

Base Year: 2008

Prepared By: AS **Date:** 5/12/2008

Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown Area Placement (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	278	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.30	$83.33	8%	9%	$98	MII Mil Assemblies	
M43B	Gravel, Delivered	53	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$9.50	$0.00	$9.50	$502.55	8%	9%	$592	V Vendor Quote	
	Temporary Gravel Access Roads																
A18B	Gravel Placement - Contaminated Area	1,667	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.39	$1.39	$2,316.67	8%	9%	$2,727	MII Mil Assemblies	
M43B	Gravel, Delivered	345	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$9.50	$0.00	$9.50	$3,277.50	8%	9%	$3,858	V Vendor Quote	
												TOTAL UNIT COST:			$7,275		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-5

Alternative 3 **Cost Worksheet: CW3-5**

Capital Cost Sub-Element

Site Clearing and Grubbing

COST WORKSHEET

Site: OU1 - Former Export Plant **Prepared By:** AS **Date:** 5/12/2008

Location: Libby, Montana

Phase: Draft Feasibility Study **Checked By:** AL **Date:** 5/12/2008

Base Year: 2008

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	2	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,398.09	$9,398.09	$18,796.18	8%	9%	$22,127	MII Mll Assemblies	
												TOTAL UNIT COST:			$22,127		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Mll assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mll assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW3-6

Alternative 3 **Cost Worksheet: CW3-6**
Capital Cost Sub-Element
Construction of Soil Cover and Riverbank Stabilization

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves the construction of an in-place containment using soil cover. It includes cost for labor, equipment and material (soil from offsite borrow area and riprap).

Cost Analysis:
Cost for Construction of Soil Cover and Riverbank Stabilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Subsoil Placement Over Contaminated Soils																
A11A	Clean Fill Spreading/Grading	24,406	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.89	$2.89	$70,532.06	8%	9%	$83,030	MII Mil Assemblies	
A21A	Clean Fill Compaction - Large Open Area	21,965	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$3,953.70	8%	9%	$4,654	MII Mil Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	2,441	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$5,100.76	8%	9%	$6,005	MII Mil Assemblies	Assume 10% of total fill
M39A	Orange Fence	594,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.10	$0.00	$0.10	$59,400.00	8%	9%	$69,926	V Vendor Quote	Assume 10% of total fill
	Topsoil Placement for Cover																
A11A	Clean Fill Spreading/Grading	8,135	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.89	$2.89	$23,510.69	8%	9%	$27,677	MII Mil Assemblies	
A21A	Clean Fill Compaction - Large Open Area	7,322	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$1,317.90	8%	9%	$1,551	MII Mil Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	814	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$1,700.25	8%	9%	$2,002	MII Mil Assemblies	Assume 10% of total fill
	Clean Fill (Subsoil) and Top Soil																
M45	Subsoil, Delivered	24,406	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$7.90	$0.00	$7.90	$192,803.89	8%	9%	$228,969	V Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	8,135	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$32.20	$0.00	$32.20	$261,952.96	8%	9%	$308,371	V Vendor Quote	Includes purchase and delivery to the Site.
	Riverbank Riprap Protection																
A15C	Riprap Removal	2,130	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.41	$8.41	$17,910.19	8%	9%	$21,084	MII Mil Assemblies	
A15A	Riprap Placement	2,130	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.41	$8.41	$17,910.19	8%	9%	$21,084	MII Mil Assemblies	
												TOTAL UNIT COST:			$772,353		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.99 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-7A

Alternative 3
Capital Cost Sub-Element
Softscape Installation Over Soil Cover

Cost Worksheet: CW3-7A

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves the revegetation of the in-place containment soil cover with sod which includes low intensity traffic areas. Softscape is assumed to cover approximately 2/3rd of the soil cover. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Softscape Installation Over Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Softscape Installation																
M20A	Sod Including Installation	382,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.38	$0.38	$137,520.00	8%	9%	$161,889	P Previous Work	Includes purchase and installation.
												TOTAL UNIT COST:			$161,889		

Notes:
HTRW productivity factor is from *Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000*
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-7B

Alternative 3 **Cost Worksheet: CW3-7B**
Capital Cost Sub-Element
Hardscape Installation Over Soil Cover

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves placing concrete over the soil cover which includes high intensity traffic. Hardscape is assumed to cover approximately 1/3rd of the soil cover. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hardscape Installation Over Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hardscape Installation																
A35A	Concrete Work	21,222	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$487,474.44	8%	9%	$573,855	MII MII Assemblies	Includes material, labor, equipment and placement costs
												TOTAL UNIT COST:			$573,855		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-8

Alternative 3
Capital Cost Sub-Element
Resurfacing of City Service Road

Cost Worksheet: CW3-8

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves resurfacing of City Service Road after the remedy is put in place due to heavy wear and tear during construction. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Resurfacing of City Service Road (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Asphalt Resurfacing																
S1A	Asphalt Pavement Construction - Resurfacing Only	33,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$99,000.00	8%	9%	$116,543	V Vendor Quote	Includes labor, material and equipment cost
												TOTAL UNIT COST:			$116,543		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-9

Alternative 3
Capital Cost Sub-Element
Mobilization/Demobilization

Cost Worksheet: CW3-9

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for developing Mob/Demob (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,815.23	$1,815.23	$10,891.38	8%	9%	$12,821	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$686.14	$686.14	$2,744.56	8%	9%	$3,231	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$216.20	$216.20	$864.80	8%	9%	$1,018	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,381.66	$1,381.66	$8,289.96	8%	9%	$9,759	MII MII Assemblies	
												TOTAL UNIT COST:			$26,829		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-10

Alternative 3 **Cost Worksheet: CW3-10**
Capital Cost Sub-Element
Surveying for Site Construction Control

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Site Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38A	Site Survey - Clean Area	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$462.08	$462.08	$1,386.24	8%	9%	$1,632	MII MII Assemblies	Assume 6 acres/day
A38B	Site Survey - Contaminated Area	4	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$994.48	$994.48	$3,977.92	8%	9%	$4,683	MII MII Assemblies	Assume 4 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$11,315		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-11

Alternative 3
Capital Cost Sub-Element
Equipment Decontamination

Cost Worksheet: CW3-11

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves decontamination of equipment used onsite. Water for decon/washing will be used from the onsite pumphouse/Kootenai River with no cost.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	66	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$143.83	$143.83	$9,492.78	8%	9%	$11,175	MII MII Assemblies	
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,227.96	$0.00	$2,227.96	$2,227.96	8%	9%	$2,623	V Vendor Quote	
												TOTAL UNIT COST:			$13,798		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-12

Alternative 3
Capital Cost Sub-Element
Site Maintenance During Construction

Cost Worksheet: CW3-12

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves Site Maintenance During Construction. The annual costs for Site Maintenance During Construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	66	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$788.09	$788.09	$50,693.94	8%	9%	$59,877	MII Mll Assemblies	Includes onsite dust control and pavement washing
	Equipment Fueling																
A2A	Equipment Fueling	66	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$147.38	$147.38	$9,725.76	8%	9%	$11,449	MII Mll Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,017.74	$1,017.74	$1,017.74	8%	9%	$1,198	MII Mll Assemblies	
M36	3" x 1,000' Yellow Caution Tape	5	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.50	$0.00	$10.50	$52.50	8%	9%	$62	P Previous Work	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	5	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.50	$0.00	$10.50	$52.50	8%	9%	$62	P Previous Work	
M38	Reflecting Barricade with Light	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$71.83	$0.00	$71.83	$718.30	8%	9%	$846	V Vendor Quote	
M39	Orange Safety Fence with Post	5	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$52.99	$0.00	$52.99	$264.95	8%	9%	$312	V Vendor Quote	
												TOTAL UNIT COST:			$73.808		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	*Adjusted Equipment for HFP*	*LF*	*Linear Foot*
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	Mll assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mll assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-13

Alternative 3
Capital Cost Sub-Element
Borrow Material Sampling

Cost Worksheet: **CW3-13**

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves determining whether asbestos fibers are present in the borrow source. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$844.47	$844.47	$844.47	8%	9%	$994	MII MII Assemblies	1 hr per sample
M50	Soil Sample Analysis (PLM-VE)	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$100.00	8%	9%	$118	P Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$100.00	8%	9%	$118	P Previous Work	
M54D	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$500.00	$500.00	$500.00	8%	9%	$589	A Allowance	
M53D	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$250.00	8%	9%	$294	P Previous Work	
												TOTAL UNIT COST:			$2,113		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW3-14

Alternative 3
Capital Cost Sub-Element
Community Awareness Activities

Cost Worksheet: CW3-14

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/12/2008
Checked By: AL **Date:** 5/12/2008

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes meeting hall, publishing and sending notices or informational flyers and general overhead

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	20	HR	1.00	$55.26	$55.26	$0.00	$0.00	$0.00	$0.00	$55.26	$1,105.20	100%	9%	$2,409	SE SalaryExpert.com	10 hrs per day
L13	Project Manager	20	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$945.00	100%	9%	$2,060	SE SalaryExpert.com	10 hrs per day
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$516.00	0%	0%	$516	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$10,000.00	0%	0%	$10,000	A Allowance	2 events per 5-yr review.
												TOTAL UNIT COST:			$14,985		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study". EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	*Unmodified Unit Cost*	HR	*Hours*
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	*An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.*
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Cost Worksheets

Alternative 4

TABLE CW4-1

Alternative 4
Capital Cost Sub-Element
Institutional Controls

Cost Worksheet: CW4-1

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves implementation of institutional control for the site. The following cost includes hours for and document legal procedures to establish and cost for document submission and recording. The cost also includes site survey to establish the site boundaries.

Cost Analysis:
Cost for Institutional Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L6	Environmental Lawyer	40	HR	1.00	$28.31	$28.31	$0.00	$0.00	$0.00	$0.00	$28.31	$1,132.40	100%	9%	$2,469	SE SalaryExpert.com	
L15	Paralegal	120	HR	1.00	$19.18	$19.18	$0.00	$0.00	$0.00	$0.00	$19.18	$2,301.60	100%	9%	$5,017	SE SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$20.44	$20.44	$0.00	$0.00	$0.00	$0.00	$20.44	$817.60	100%	9%	$1,782	SE SalaryExpert.com	
M11A	Document Submission and Recording Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
A38A	Site Survey - Clean Area	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$462.08	$462.08	$924.16	8%	9%	$1,088	MII MII Assemblies	To establish site boundary and parcel boundaries as needed
M12	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	0%	0%	$15,000	A Allowance	
												TOTAL UNIT COST:			$30,356		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-2A

Alternative 4
Capital Cost Sub-Element
Borrow Material Sampling

Cost Worksheet: CW4-2A

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves determining whether asbestos fibers are present in the borrow source. The following includes the labor, material and equipment cost, and shipping cost required for the borrow material sampling.

Cost Analysis:
Cost for Borrow Material Sampling (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$844.47	$844.47	$844.47	8%	9%	$994	MII MII Assemblies	
M50	Soil Sample Analysis (PLM-VE)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$75.00	8%	9%	$88	P Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$75.00	8%	9%	$88	P Previous Work	
M54D	Sample Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$500.00	$500.00	$500.00	8%	9%	$589	A Allowance	
M53D	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$250.00	8%	9%	$294	P Previous Work	
												TOTAL UNIT COST:			$2,053		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study". EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-2B

Alternative 4
Capital Cost Sub-Element
Community Awareness Activities

Cost Worksheet: **CW4-2B**

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves setting up a community meeting to inform the local community about the status of site. The following includes the labor, material and other cost required for setting up the community awareness meeting which includes meeting hall, publishing and sending notices or informational flyers and general overhead.

Cost Analysis:
Cost for Community Awareness Activities (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
L12	General Superintendent (P.M.)	20	HR	1.00	$55.26	$55.26	$0.00	$0.00	$0.00	$0.00	$55.26	$1,105.20	100%	9%	$2,409	SE SalaryExpert.com	10 hrs per day
L13	Project Manager	20	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$945.00	100%	9%	$2,060	SE SalaryExpert.com	10 hrs per day
M56	Per Diem for 2 Person	2	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$516.00	0%	0%	$516	GSA www.gsa.gov	
M65	Community Awareness Activities Allowance	2	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$10,000.00	0%	0%	$10,000	A Allowance	2 events per 5-yr review.
												TOTAL UNIT COST:			$14,985		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-2C

Alternative 4
Capital Cost Sub-Element
5-Year Site Reviews

Cost Worksheet: CW4-2C

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the 5-year site visits and 5-year site review report. The following cost includes labor, material and shipping costs for site visits and 5-year site review reports.

Cost Analysis:
Cost for 5-Year Site Review (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$807.77	$807.77	$807.77	8%	9%	$951	MII MII Assemblies	
M56	Per Diem for 2 Person	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$258.00	0%	0%	$258	GSA www.gsa.gov	
L13	Project Manager	40	HR	1.00	$47.25	$47.25	$0.00	$0.00	$0.00	$0.00	$47.25	$1,890.00	100%	9%	$4,120	SE SalaryExpert.com	Hours for 5-year review report
L5	Environmental Engineer	120	HR	1.00	$28.86	$28.86	$0.00	$0.00	$0.00	$0.00	$28.86	$3,463.20	100%	9%	$7,550	SE SalaryExpert.com	Hours for 5-year review report
L7	Environmental Scientist	160	HR	1.00	$29.28	$29.28	$0.00	$0.00	$0.00	$0.00	$29.28	$4,684.80	100%	9%	$10,213	SE SalaryExpert.com	Hours for 5-year review report
L14	Quality Control Engineer	24	HR	1.00	$39.73	$39.73	$0.00	$0.00	$0.00	$0.00	$39.73	$953.52	100%	9%	$2,079	SE SalaryExpert.com	Hours for 5-year review report
L1	CAD Drafter	40	HR	1.00	$24.11	$24.11	$0.00	$0.00	$0.00	$0.00	$24.11	$964.40	100%	9%	$2,102	SE SalaryExpert.com	Hours for 5-year review report
L3	Clerks, Typist, Bookkeeper & Receptionist	40	HR	1.00	$20.44	$20.44	$0.00	$0.00	$0.00	$0.00	$20.44	$817.60	100%	9%	$1,782	SE SalaryExpert.com	Hours for 5-year review report
M10A	Copy and Shipping Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$32,055		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-3

Alternative 4 **Cost Worksheet: CW4-3**
Capital Cost Sub-Element
Temporary Laydown and Access Road Installation

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves temporary gravel construction at the site for the gravel laydown area and temporary access roads used to access contaminated areas during construction. It includes costs for material, labor, and equipment.

Cost Analysis:
Cost for Temporary Laydown & Access Road Installation (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Gravel Laydown Area																
A18A	Gravel Placement - Clean Area	278	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.30	$0.30	$83.33	8%	9%	$98	MII MII Assemblies	
M43B	Gravel, Delivered	53	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$9.50	$0.00	$9.50	$502.55	8%	9%	$592	V Vendor Quote	
	Temporary Gravel Access Roads																
A18B	Gravel Placement - Contaminated Area	1,667	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1.39	$1.39	$2,316.67	8%	9%	$2,727	MII MII Assemblies	Assume 1000 ft road, 15 ft wide
M43B	Gravel, Delivered	345	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$9.50	$0.00	$9.50	$3,277.50	8%	9%	$3,858	V Vendor Quote	
												TOTAL UNIT COST:			$7,275		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-4

Alternative 4 **Cost Worksheet: CW4-4**
Capital Cost Sub-Element
Site Clearing and Grubbing

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves site clearing and grubbing of the contaminated area. It includes costs for labor, equipment and materials. All the cleared and grubbed material will be chipped in-place.

Cost Analysis:
Cost for Site Clearing and Grubbing (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A32A	Clearing and Grubbing	2	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,398.09	$9,398.09	$18,796.18	8%	9%	$22,127	MII Mll Assemblies	
												TOTAL UNIT COST:			$22,127		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist: **NOTES:**

FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	*Unburdened Line Item Cost*	LCY	*Loose Cubic Yard*
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-5

Alternative 4
Capital Cost Sub-Element
Contaminated Soils Removal

Cost Worksheet: CW4-5

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the removal of Contaminated Soils for offsite disposal. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Contaminated Soils Removal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A8A	Excavation/Loading - Contaminated Soils	21,222	BCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.89	$8.89	$188,665.58	8%	9%	$222,097	MII_MII Assemblies	
												TOTAL UNIT COST:			$222,097		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-6

Alternative 4 **Cost Worksheet: CW4-6**

Capital Cost Sub-Element

Disposal of Excavated Contaminated Soils

COST WORKSHEET

Site: OU1 - Former Export Plant **Prepared By:** AS **Date:** 5/13/2008

Location: Libby, Montana

Phase: Draft Feasibility Study **Checked By:** AL **Date:** 5/14/2008

Base Year: 2008

Work Statement:
This sub-element involves hauling and handling costs of excavated contaminated soils for offsite disposal at the Former Libby Vermiculite Mine. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hauling of Excavated ACM for Disposal (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A23A	Hauling Offsite - Former Libby Vermiculite Mine	24,408	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.50	$10.50	$256,283.00	8%	9%	$301,673	MII MII Assemblies	
S3A	Contaminated Soils Handling at the Mine	33,558	TN	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5.50	$5.50	$184,570.38	8%	9%	$217,276	V Vendor Quote	Includes labor, material and equipment cost
												TOTAL UNIT COST:			$518,949		

Notes:

HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000

The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:

NA Not Applicable - costs are from previous work or vendor quote

For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-7

Alternative 4
Capital Cost Sub-Element
Backfilling and Riverbank Stabilization

Cost Worksheet: CW4-7

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the backfilling of the excavated site. The backfill would include a subsoil layer placed below a amended topsoil layer. It includes cost for labor, equipment and material (soil from offsite borrow area and riprap).

Cost Analysis:
Cost for Backfilling and Riverbank Stabilization (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Clean Fill (Subsoil) and Top Soil																
M45	Subsoil, Delivered	12,203	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$7.90	$0.00	$7.90	$96,401.94	8%	9%	$113,484	V Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	8,135	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$32.20	$0.00	$32.20	$261,952.96	8%	9%	$308,371	V Vendor Quote	Includes purchase and delivery to the Site.
	Subsoil Replacement and Compaction																
A11A	Clean Fill Spreading/Grading	12,203	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.89	$2.89	$35,266.03	8%	9%	$41,515	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	10,983	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$1,976.85	8%	9%	$2,327	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	1,220	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$2,550.38	8%	9%	$3,002	MII MII Assemblies	Assume 10% of total fill
M39A	Orange Fence	594,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.10	$0.00	$0.10	$59,400.00	8%	9%	$69,926	V Vendor Quote	Assume 10% of total fill
	Topsoil Replacement and Compaction																
A11A	Clean Fill Spreading/Grading	8,135	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.89	$2.89	$23,510.69	8%	9%	$27,677	MII MII Assemblies	
A21A	Clean Fill Compaction - Large Open Area	7,322	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.18	$1,317.90	8%	9%	$1,551	MII MII Assemblies	Assume 90% of total fill
A22A	Clean Fill Compaction - Small Area	814	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.09	$2.09	$1,700.25	8%	9%	$2,002	MII MII Assemblies	Assume 10% of total fill
	Riverbank Riprap Protection																
A15C	Riprap Removal	2,130	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.41	$8.41	$17,910.19	8%	9%	$21,084	MII MII Assemblies	
A15A	Riprap Placement	2,130	LCY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.41	$8.41	$17,910.19	8%	9%	$21,084	MII MII Assemblies	
												TOTAL UNIT COST:			$612,023		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-8

Alternative 4
Capital Cost Sub-Element
Softscape Installation Over Soil Cover

Cost Worksheet: CW4-8

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the revegetation of the in-place containment soil cover with sod which includes low intensity traffic areas. Softscape is assumed to cover approximately 2/3rd of the soil cover. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Softscape Installation Over Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Softscape Installation																
M20A	Sod Including Installation	382,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.36	$0.38	$137,520.00	8%	9%	$161,889	P Previous Work	Includes purchase and installation.
												TOTAL UNIT COST:			$161,889		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	*Adjusted Labor for HFP*	EA	*Each*
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	*Unmodified Unit Cost*	HR	*Hours*
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	Mil assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for Mil assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-9

Alternative 4 **Cost Worksheet: CW4-9**
Capital Cost Sub-Element
Hardscape Installation Over Soil Cover

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves placing concrete over the soil cover which includes high intensity traffic. Hardscape is assumed to cover approximately 1/3rd of the soil cover. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hardscape Installation Over Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Hardscape Installation																
A35A	Concrete Work	21,222	SY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$487,474.44	8%	9%	$573,855	MII MII Assemblies	Includes material, labor, equipment and placement costs
												TOTAL UNIT COST:			$573,855		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-10

Alternative 4
Capital Cost Sub-Element
Mobilization/Demobilization

Cost Worksheet: CW4-10

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves mobilization and demobilization of all the required equipment to and from the site respectively.

Cost Analysis:
Cost for developing Mob/Demob (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A37A	Mobilization and Demobilization - Heavy Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,815.23	$1,815.23	$10,891.38	8%	9%	$12,821	MII MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	6	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$686.14	$686.14	$4,116.84	8%	9%	$4,846	MII MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	4	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$216.20	$216.20	$864.80	8%	9%	$1,018	MII MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	8	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,381.66	$1,381.66	$11,053.28	8%	9%	$13,012	MII MII Assemblies	
												TOTAL UNIT COST:			$31,697		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-11

Alternative 4 **Cost Worksheet: CW4-11**
Capital Cost Sub-Element
Surveying for Site Construction Control

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves cost for site surveying before and after the remedial alternative is implemented.

Cost Analysis:
Cost for Surveying for Site Construction Control (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A38B	Site Survey - Contaminated Area	4	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$994.48	$994.48	$3,977.92	8%	9%	$4,683	MII MII Assemblies	Assume 4 acres/day
A38A	Site Survey - Clean Area	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$462.08	$462.08	$1,386.24	8%	9%	$1,632	MII MII Assemblies	Assume 6 acres/day
M12A	Surveying Report Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000.00	0%	0%	$5,000	A Allowance	
												TOTAL UNIT COST:			$11,315		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-12

Alternative 4
Capital Cost Sub-Element
Equipment Decontamination

Cost Worksheet: CW4-12

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves decontamination of equipment used onsite. Water for decon/washing will be used from the onsite pumphouse/Kootenai River with no cost.

Cost Analysis:
Cost for Equipment Decontamination (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Equipment Decon/Washing																
A3A	Equipment Decon/Washing	82	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$143.83	$143.83	$11,794.06	8%	9%	$13,884	MII MII Assemblies	
M46	Poly Tank, 5,300 Gal	1	EA	1.00	$0.00	$0.00	$0.00	$0.00	$2,227.96	$0.00	$2,227.96	$2,227.96	8%	9%	$2,623	V Vendor Quote	
												TOTAL UNIT COST:			$16,507		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	*Adjusted Equipment for HFP*	LF	*Linear Foot*
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-13

Alternative 4 **Cost Worksheet: CW4-13**
Capital Cost Sub-Element
Site Maintenance During Construction

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves Site Maintenance During Construction. The annual costs for Site Maintenance During Construction include labor, material, and equipment.

Cost Analysis:
Cost for Site Maintenance During Construction (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Dust Control																
A1A	Dust Control/Washing	82	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$768.09	$768.09	$62,983.38	8%	9%	$74,144	MII MII Assemblies	Includes onsite dust control and pavement washing
	Equipment Fueling																
A2A	Equipment Fueling	82	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$147.36	$147.36	$12,083.52	8%	9%	$14,225	MII MII Assemblies	
	Construction Safety and Traffic Control																
A33A	Barricade and Traffic Control Setup	1	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,017.74	$1,017.74	$1,017.74	8%	9%	$1,198	MII MII Assemblies	
M36	3" x 1,000' Yellow Caution Tape	5	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.50	$0.00	$10.50	$52.50	8%	9%	$62	P Previous Work	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	5	RL	1.00	$0.00	$0.00	$0.00	$0.00	$10.50	$0.00	$10.50	$52.50	8%	9%	$62	P Previous Work	
M38	Reflecting Barricade with Light	10	EA	1.00	$0.00	$0.00	$0.00	$0.00	$71.83	$0.00	$71.83	$718.30	8%	9%	$848	V Vendor Quote	
M39	Orange Safety Fence with Post	5	CLF	1.00	$0.00	$0.00	$0.00	$0.00	$52.99	$0.00	$52.99	$264.95	8%	9%	$312	V Vendor Quote	
												TOTAL UNIT COST:			$90,849		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-14A

Alternative 4
Capital Cost Sub-Element
Backfill and Erosion Controls O&M

Cost Worksheet: CW4-14A

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the general operations and maintenance pertaining to the OU1 site area and erosion controls along the Kootenai river at the site. It includes costs for on-site labor, equipment, materials and allowances for maintaining the reclaimed area.

Cost Analysis:
Cost for Backfill and Erosion Controls O&M (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A7A	Operations and Maintenance Crew	12	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$823.25	$823.25	$9,879.00	8%	9%	$11,630	MII MII Assemblies	
M48A	Sod Maintenance Allowance	8.8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$250.00	$250.00	$2,200.00	8%	9%	$2,590	A Allowance	
M48B	Concrete Maintenance Allowance	4.4	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$450.00	$450.00	$1,980.00	8%	9%	$2,331	A Allowance	
M48	Weed Control Services Allowance	8.8	ACR	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$100.00	$100.00	$880.00	8%	9%	$1,036	A Allowance	
M21B	Erosion Repair Material Allowance	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,000.00	$3,000.00	$3,000.00	0%	0%	$3,000	A Allowance	
												TOTAL UNIT COST:			$20,587		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	NOTES:
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-14B

Alternative 4
Capital Cost Sub-Element
Annual Site Inspection

Cost Worksheet: CW4-14B

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the Annual Site Inspection to inspect the integrity of the all the remedial components of the remedy put in place. It includes costs for on-site labor, equipment, materials.

Cost Analysis:
Cost for Annual Site Inspection (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A6A	Site Inspection - 2 Person Crew	6	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$807.77	$807.77	$4,846.62	8%	9%	$5,705	MII MII Assemblies	
												TOTAL UNIT COST:			$5,705		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.96 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

TABLE CW4-15

Alternative 4 **Cost Worksheet: CW4-15**
Capital Cost Sub-Element
Resurfacing of City Service Road (Outside the OU1 Site Boundary)

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves resurfacing of City Service Road after the remedy is put in place due to heavy wear and tear during construction. It includes costs for labor, material, and equipment.

Cost Analysis:
Cost for Hardscape Installation Over Soil Cover (Lump Sum)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
	Asphalt Resurfacing																
S1A	Asphalt Pavement Construction - Resurfacing Only	33,000	SF	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.00	$3.00	$99,000.00	8%	9%	$116,543	V Vendor Quote	Includes labor, material and equipment cost
												TOTAL UNIT COST:			$116,543		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	*100 Linear Foot*
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	*Unmodified Line Item Cost*	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:	**NOTES:**
FACTOR:	Field work will be in Level "C" PPE.
H&S Productivity (labor and equipment only)	MII assembly costs include HPF adjustments.
Escalation to Base Year	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Area Cost Factor	*An AF of 0.86 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.*
Subcontractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
Prime Contractor Overhead and Profit	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

TABLE CW4-16

Alternative 4
Capital Cost Sub-Element
Removal Confirmation Soil Sampling

Cost Worksheet: CW4-16

COST WORKSHEET

Site: OU1 - Former Export Plant
Location: Libby, Montana
Phase: Draft Feasibility Study
Base Year: 2008

Prepared By: AS **Date:** 5/13/2008
Checked By: AL **Date:** 5/14/2008

Work Statement:
This sub-element involves the removal sampling data evaluation report. The following cost includes labor, material and shipping costs for the removal sampling data evaluation report.

Cost Analysis:
Cost for Removal Sampling Data Evaluation Report (Each)

COST DATABASE CODE	DESCRIPTION	QTY	UNIT(S)	HPF	LABOR	ADJ LABOR	EQUIP	ADJ EQUIP	MATL	OTHER	UNMOD UC	UNMOD LIC	PC OH	PC PF	BUR LIC	COST SOURCE CITATION	COMMENTS
A4A	Sampling - 2 Person Crew	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$844.47	$844.47	$2,533.41	8%	9%	$2,982	MII MII Assemblies	
M56	Per Diem for 2 Person	3	DY	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$258.00	$258.00	$774.00	0%	0%	$774	GSA www.gsa.gov	
				1.00	$0.00	$0.00	$0.00	$0.00	$0.00		$0.00	$0.00			$0		
M50	Soil Sample Analysis (PLM-VE)	40	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$990.00	8%	9%	$1,165	P Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	40	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$25.00	$25.00	$990.00	8%	9%	$1,165	P Previous Work	
M53B	Sampling/Other Supplies	1	LS	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$1,500.00	$1,500.00	$1,500.00	8%	9%	$1,766	P Previous Work	
M54C	Sample Shipping	3	EA	1.00	$0.00	$0.00	$0.00	$0.00	$0.00	$120.00	$120.00	$360.00	8%	9%	$424	P Previous Work	15 Samples per shipment
												TOTAL UNIT COST:			$8,276		

Notes:
HTRW productivity factor is from Exhibit B-3 or B-4 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000
The Cost Database Code is a reference code for linking with line item cost information with the cost source database and is not otherwise used within these cost worksheets.

Source of Cost Data:
NA Not Applicable - costs are from previous work or vendor quote
For citation references, the following sources apply:

Abbreviations:

QTY	Quantity	ACR	Acres
EQUIP	Equipment	BCY	Bank Cubic Yard
MATL	Material	CLF	100 Linear Foot
HPF	HTRW Productivity Factor	DY	Days
ADJ LABOR	Adjusted Labor for HFP	EA	Each
ADJ EQUIP	Adjusted Equipment for HFP	LF	Linear Foot
UNMOD UC	Unmodified Unit Cost	HR	Hours
UNMOD LIC	Unmodified Line Item Cost	LB	Pounds
UNBUR LIC	Unburdened Line Item Cost	LCY	Loose Cubic Yard
PC OH	Prime Contractor Overhead	LS	Lump Sum
PC PF	Prime Contractor Profit	RL	Roll
BUR LIC	Burdened Line Item Cost	SY	Square Yard
		TN	Tons

Cost Adjustment Checklist:

FACTOR:	NOTES:
H&S Productivity (labor and equipment only)	Field work will be in Level "C" PPE.
Escalation to Base Year	MII assembly costs include HPF adjustments.
Area Cost Factor	2008 cost sources are not escalated (EF=1.00). All other costs are escalated based on the USACE CWCCIS, EM 1110-2-1304, Sep 2007.
Subcontractor Overhead and Profit	An AF of 0.98 is used for Montana, except that an AF of 1.00 (national unmodified average) is used for MII assembly costs and local vendor quotes.
Prime Contractor Overhead and Profit	It is assumed that Subcontractor O&P is either included in the PC O&P or has been factored into vendor quotes or previous work.
	It is assumed that home office OH is 8% and profit is 9% for the Prime Contractor.

Cost Estimate Backup

COST INDICES FOR ESCALATION

Base Year for Work: **2008**

Year	Cost Index[1]
1990	398.34
1991	406.78
1992	415.22
1993	427.83
1994	439.45
1995	452.31
1996	462.16
1997	472.17
1998	478.10
1999	486.21
2000	497.07
2001	503.52
2002	517.46
2003	529.95
2004	571.29
2005	608.36
2006	641.91
2007	670.58
2008	**687.63**
2009	702.76
2010	717.52
2011	731.87
2012	746.51
2013	761.44
2014	776.67
2015	792.20
2016	808.04
2017	824.20
2018	840.69
2019	857.50
2020	874.65
2021	892.15
2022	909.99
2023	928.19
2024	946.75
2025	965.69

1 Yearly composite cost index (weighted average) from the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS), EM 1110-2-1304, 31 March 2000. Revised as of 30 September 2007.

SalaryExpert Cost Sources

Base Year: 2008

COST CODES FOR LABOR AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source		Comments
																Source	Source ID	
L1	CAD Drafter	HR	$24.11	$0.00	$0.00	$0.00	2008	1	1	$24.11	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L2	Civil Engineer	HR	$30.34	$0.00	$0.00	$0.00	2008	1	1	$30.34	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L3	Clerks, Typist, Bookkeeper & Receptionist	HR	$20.44	$0.00	$0.00	$0.00	2008	1	1	$20.44	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L4	Electrical Engineer	HR	$29.79	$0.00	$0.00	$0.00	2008	1	1	$29.79	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L5	Environmental Engineer	HR	$28.88	$0.00	$0.00	$0.00	2008	1	1	$28.88	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L6	Environmental Lawyer	HR	$28.31	$0.00	$0.00	$0.00	2008	1	1	$28.31	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L7	Environmental Scientist	HR	$29.28	$0.00	$0.00	$0.00	2008	1	1	$29.28	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L8	Field Engineer	HR	$28.27	$0.00	$0.00	$0.00	2008	1	1	$28.27	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L9	Field Foreman	HR	$23.84	$0.00	$0.00	$0.00	2008	1	1	$23.84	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L10	Field Technician	HR	$19.22	$0.00	$0.00	$0.00	2008	1	1	$19.22	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L11	Geologist	HR	$27.11	$0.00	$0.00	$0.00	2008	1	1	$27.11	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L12	General Superintendent (P.M.)	HR	$55.26	$0.00	$0.00	$0.00	2008	1	1	$55.26	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L13	Project Manager	HR	$47.25	$0.00	$0.00	$0.00	2008	1	1	$47.25	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L14	Quality Control Engineer	HR	$39.73	$0.00	$0.00	$0.00	2008	1	1	$39.73	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L15	Paralegal	HR	$19.18	$0.00	$0.00	$0.00	2008	1	1	$19.18	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L18	Suveyor	HR	$34.06	$0.00	$0.00	$0.00	2008	1	1	$34.06	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	
L19	Suveyor Assistant	HR	$23.70	$0.00	$0.00	$0.00	2008	1	1	$23.70	$0.00	$0.00	$0.00	100%	9%	SE	SalaryExpert.com	

Base Year: 2008

COST CODES FOR MATERIAL AND UNIT COSTS

Cost Code	Description	Units	Unit Labor Cost	Unit Equipment Cost	Unit Material Cost	Unit Other Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Labor Cost	Adjusted Equipment Cost	Adjusted Material Cost	Adjusted Other Cost	PC OH	PC PF	Cost Source		Comments
																Source	Source ID	
M4	Pipe, Galvanized Pipe, 2 1/2" Dia, 6' High	EA	$0.00	$0.00	$17.50	$0.00	2008	1	1	$0.00	$0.00	$17.50	$0.00	8%	9%	V	Vendor Quote	
M9	Signs	EA	$0.00	$0.00	$79.92	$0.00	2008	1	1	$0.00	$0.00	$79.92	$0.00	8%	9%	V	Vendor Quote	
M10A	Copy and Shipping Allowance	LS	$0.00	$0.00	$0.00	$3,000	2008	1	1	$0.00	$0.00	$0.00	$3,000.00	0%	0%	A	Allowance	
M11A	Document Submission and Recording Allowance	LS	$0.00	$0.00	$0.00	$5,000	2008	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M12	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	$15,000.00	2008	1	1	$0.00	$0.00	$0.00	$15,000.00	0%	0%	A	Allowance	
M12A	Surveying Report Allowance	LS	$0.00	$0.00	$0.00	$5,000.00	2008	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M20A	Sod Including Installation	SF	$0.00	$0.00	$0.00	$0.36	2008	1	1	$0.00	$0.00	$0.00	$0.36	8%	9%	P	Previous Work	Includes purchase and installation.
M21	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	$5,000.00	2008	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	
M21B	Erosion Repair Material Allowance	LS	$0.00	$0.00	$0.00	$3,000.00	2008	1	1	$0.00	$0.00	$0.00	$3,000.00	0%	0%	A	Allowance	
M22	Sign Maintenance Allowance	LS	$0.00	$0.00	$0.00	$1,000.00	2008	1	1	$0.00	$0.00	$0.00	$1,000.00	0%	0%	A	Allowance	
M36	3" x 1,000' Yellow Caution Tape	RL	$0.00	$0.00	$10.50	$0.00	2008	1	1	$0.00	$0.00	$10.50	$0.00	8%	9%	P	Previous Work	
M37	3" x 1,000' Red Danger Asbestos Haz Tape	RL	$0.00	$0.00	$10.50	$0.00	2008	1	1	$0.00	$0.00	$10.50	$0.00	8%	9%	P	Previous Work	
M38	Reflecting Barricade with Light	EA	$0.00	$0.00	$71.83	$0.00	2008	1	1	$0.00	$0.00	$71.83	$0.00	8%	9%	V	Vendor Quote	
M39	Orange Safety Fence with Post	CLF	$0.00	$0.00	$52.99	$0.00	2008	1	1	$0.00	$0.00	$52.99	$0.00	8%	9%	V	Vendor Quote	
M39A	Orange Fence	SF	$0.00	$0.00	$0.10	$0.00	2008	1	1	$0.00	$0.00	$0.10	$0.00	8%	9%	V	Vendor Quote	
M43B	Gravel, Delivered	LCY	$0.00	$0.00	$9.50	$0.00	2008	1	1	$0.00	$0.00	$9.50	$0.00	8%	9%	V	Vendor Quote	
M44A	Riprap, Delivered	TN	$0.00	$0.00	$50.00	$0.00	2008	1	1	$0.00	$0.00	$50.00	$0.00	8%	9%	V	Vendor Quote	
M44B	Riprap, Delivered	LCY	$0.00	$0.00	$67.00	$0.00	2008	1	1	$0.00	$0.00	$67.00	$0.00	8%	9%	V	Vendor Quote	
M45	Subsoil, Delivered	LCY	$0.00	$0.00	$7.90	$0.00	2008	1	1	$0.00	$0.00	$7.90	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M45A	Topsoil Amended, Delivered	LCY	$0.00	$0.00	$32.20	$0.00	2008	1	1	$0.00	$0.00	$32.20	$0.00	8%	9%	V	Vendor Quote	Includes purchase and delivery to the Site.
M46	Poly Tank, 5,300 Gal	EA	$0.00	$0.00	$2,227.96	$0.00	2008	1	1	$0.00	$0.00	$2,227.96	$0.00	8%	9%	V	Vendor Quote	
M48	Weed Control Services Allowance	ACR	$0.00	$0.00	$0.00	$100.00	2008	1	1	$0.00	$0.00	$0.00	$100.00	8%	9%	A	Allowance	
M48A	Sod Maintenance Allowance	ACR	$0.00	$0.00	$0.00	$250.00	2008	1	1	$0.00	$0.00	$0.00	$250.00	8%	9%	A	Allowance	
M48B	Concrete Maintenance Allowance	ACR	$0.00	$0.00	$0.00	$450.00	2008	1	1	$0.00	$0.00	$0.00	$450.00	8%	9%	A	Allowance	
M50	Soil Sample Analysis (PLM-VE)	EA	$0.00	$0.00	$0.00	$25.00	2008	1	1	$0.00	$0.00	$0.00	$25.00	8%	9%	P	Previous Work	
M50A	Soil Sample Analysis (Stereomicroscopy)	EA	$0.00	$0.00	$0.00	$25.00	2008	1	1	$0.00	$0.00	$0.00	$25.00	8%	9%	P	Previous Work	
M53B	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	$1,500.00	2008	1	1	$0.00	$0.00	$0.00	$1,500.00	8%	9%	P	Previous Work	
M53D	Sampling/Other Supplies	LS	$0.00	$0.00	$0.00	$250.00	2008	1	1	$0.00	$0.00	$0.00	$250.00	8%	9%	P	Previous Work	
M54B	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	$2,000.00	2008	1	1	$0.00	$0.00	$0.00	$2,000.00	0%	0%	A	Allowance	For 1 Event
M54C	Sample Shipping	EA	$0.00	$0.00	$0.00	$120.00	2008	1	1	$0.00	$0.00	$0.00	$120.00	8%	9%	P	Previous Work	15 Samples per shipment
M54D	Sample Shipping Allowance	LS	$0.00	$0.00	$0.00	$500.00	2008	1	1	$0.00	$0.00	$0.00	$500.00	8%	9%	A	Allowance	
M55	Per Diem for 3 Person	DY	$0.00	$0.00	$0.00	$387.00	2008	1	1	$0.00	$0.00	$0.00	$387.00	0%	0%	GSA	www.gsa.gov	
M56	Per Diem for 2 Person	DY	$0.00	$0.00	$0.00	$258.00	2008	1	1	$0.00	$0.00	$0.00	$258.00	0%	0%	GSA	www.gsa.gov	
M51A	Ambient Air Sample Analysis	EA	$0.00	$0.00	$0.00	$400.00	2008	1	1	$0.00	$0.00	$0.00	$400.00	8%	9%	P	Previous Work	Analyzed by TEM ISO Method 10312
M52A	Sampling Setup (Equipment and Utility)	LS	$0.00	$0.00	$0.00	$4,200.00	2008	1	1	$0.00	$0.00	$0.00	$4,200.00	8%	9%	P	Previous Work	Includes sampling equipments and electrical hook-up
M52B	Equipment/Ambient Air Sampling Event	EA	$0.00	$0.00	$0.00	$150.00	2008	1	1	$0.00	$0.00	$0.00	$150.00	8%	9%	P	Previous Work	
M53C	Sampling/Other Supplies/Ambient Air Sampling Event	LS	$0.00	$0.00	$0.00	$1,500.00	2008	1	1	$0.00	$0.00	$0.00	$1,500.00	8%	9%	P	Previous Work	
M65	Community Awareness Activities Allowance	EA	$0.00	$0.00	$0.00	$5,000.00	2008	1	1	$0.00	$0.00	$0.00	$5,000.00	0%	0%	A	Allowance	2 events per 5-yr review.

Base Year: 2008

COST CODES FOR SUBCONTRACTORS AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted Unit Cost	PC OH	PC PF	Cost Source		Comments
											Source	Source ID	
S1A	Asphalt Pavement Construction	Asphalt Pavement Construction - Resurfacing Only	SF	$3.00	2008	1.00	1	$3.00	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost
S2A	Asphalt Pavement Construction	Asphalt Pavement Construction - Base and Surfacing	SF	$5.40	2008	1.00	1	$5.40	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost
S3A	Contaminated Soils Handling	Contaminated Soils Handling at the Mine	TN	$5.50	2008	1.00	1	$5.50	8%	9%	V	Vendor Quote	Includes labor, material and equipment cost

Base Year: 2008

COST CODES FOR MII ASSEMBLIES AND UNIT COSTS

Cost Code	Work or Material Description	Description for Cost Worksheets	Units	MII Unit Cost	Year of Cost Source	Escalation Factor	Area Factor	Adjusted MII Unit Cost	PC OH	PC PF	Cost Source		Comments
											Source	Source ID	
A1A	Dust Control	Dust Control/Washing	DY	$768.09	2008	1.00	1	$768.09	8%	9%	MII	MII Assemblies	
A2A	Equipment Fueling	Equipment Fueling	DY	$147.36	2008	1.00	1	$147.36	8%	9%	MII	MII Assemblies	
A3A	Equipment Decon/Washing	Equipment Decon/Washing	DY	$143.83	2008	1.00	1	$143.83	8%	9%	MII	MII Assemblies	
A4A	Sampling - 2 Person Crew	Sampling - 2 Person Crew	DY	$844.47	2008	1.00	1	$844.47	8%	9%	MII	MII Assemblies	
A5A	Sampling - 3 Person Crew	Sampling - 3 Person Crew	DY	$1,221.46	2008	1.00	1	$1,221.46	8%	9%	MII	MII Assemblies	
A6A	Site Inspection - 2 Person Crew	Site Inspection - 2 Person Crew	DY	$807.77	2008	1.00	1	$807.77	8%	9%	MII	MII Assemblies	
A6B	Visual Inspection - 2 Person Crew	Visual Inspection - 2 Person Crew	DY	$807.77	2008	1.00	1	$807.77	8%	9%	MII	MII Assemblies	
A7A	Site Operations and Maintenance	Operations and Maintenance Crew	DY	$823.25	2008	1.00	1	$823.25	8%	9%	MII	MII Assemblies	
A7B	Site Operations and Maintenance	Fence Maintenance Crew	DY	$823.25	2008	1.00	1	$823.25	8%	9%	MII	MII Assemblies	
A8A	Excavation/Loading - Contaminated Soils	Excavation/Loading - Contaminated Soils	BCY	$8.89	2008	1.00	1	$8.89	8%	9%	MII	MII Assemblies	
A11A	Grading - Clean Fill Loading/Spreading/Grading	Clean Fill Spreading/Grading	LCY	$2.89	2008	1.00	1	$2.89	8%	9%	MII	MII Assemblies	
A14A	Material Loading - Contaminated Soils	Material Loading - Contaminated Soils	LCY	$0.91	2008	1.00	1	$0.91	8%	9%	MII	MII Assemblies	
A15A	Material Placement - Riprap	Riprap Placement	LCY	$8.41	2008	1.00	1	$8.41	8%	9%	MII	MII Assemblies	
A15B	Material Placement - Riprap	Riprap Placement	TN	$4.21	2008	1.00	1	$4.21	8%	9%	MII	MII Assemblies	
A15C	Material Placement - Riprap	Riprap Removal	LCY	$8.41	2008	1.00	1	$8.41	8%	9%	MII	MII Assemblies	
A16A	Material Placement - Fill/Subsoil/Topsoil - Clean Fill	Clean Fill/Subsoil/Topsoil Placement	LCY	$1.95	2008	1.00	1	$1.95	8%	9%	MII	MII Assemblies	
A17A	Material Placement - Sand/Gravel Placement	Sand/Gravel Placement	LCY	$1.95	2008	1.00	1	$1.95	8%	9%	MII	MII Assemblies	
A18A	Gravel Placement - Clean Area	Gravel Placement - Clean Area	SY	$0.30	2008	1.00	1	$0.30	8%	9%	MII	MII Assemblies	
A18B	Gravel Placement - Contaminated Area	Gravel Placement - Contaminated Area	SY	$1.39	2008	1.00	1	$1.39	8%	9%	MII	MII Assemblies	
A21A	Compaction - Large Open Area - Clean Fill	Clean Fill Compaction - Large Open Area	LCY	$0.18	2008	1.00	1	$0.18	8%	9%	MII	MII Assemblies	
A22A	Compaction - Small Area - Clean Fill	Clean Fill Compaction - Small Area	LCY	$2.09	2008	1.00	1	$2.09	8%	9%	MII	MII Assemblies	
A23A	Hauling Offsite - Former Libby Vermiculite Mine	Hauling Offsite - Former Libby Vermiculite Mine	LCY	$10.50	2008	1.00	1	$10.50	8%	9%	MII	MII Assemblies	
A23B	Hauling Offsite - Former Libby Vermiculite Mine	Hauling Offsite - Former Libby Vermiculite Mine	HR	$105.36	2008	1.00	1	$105.36	8%	9%	MII	MII Assemblies	
A30A	Hydro-Seeding Crew	Hydro-Seeding Crew	ACR	$86.67	2008	1.00	1	$86.67	8%	9%	MII	MII Assemblies	
A31A	Fence Installation	Fence Installation - Contaminated Area	LF	$38.48	2008	1.00	1	$38.48	8%	9%	MII	MII Assemblies	
A31B	Fence Installation	Fence Installation - Clean Area	LF	$9.89	2008	1.00	1	$9.89	8%	9%	MII	MII Assemblies	
A31C	Signage Installation	Signage Installation - Clean Area	HR	$182.97	2008	1.00	1	$182.97	8%	9%	MII	MII Assemblies	
A32A	Clearing and Grubbing	Clearing and Grubbing	ACR	$9,398.09	2008	1.00	1	$9,398.09	8%	9%	MII	MII Assemblies	
A33A	Barricade and Traffic Control	Barricade and Traffic Control Setup	DY	$1,017.74	2008	1.00	1	$1,017.74	8%	9%	MII	MII Assemblies	
A34A	Asphalt Work	Asphalt Work	SY	$15.09	2008	1.00	1	$15.09	8%	9%	MII	MII Assemblies	
A35A	Concrete Work	Concrete Work	SY	$22.97	2008	1.00	1	$22.97	8%	9%	MII	MII Assemblies	Includes material, labor, equipment and placement costs
A37A	Mobilization and Demobilization - Heavy Equipment	Mobilization and Demobilization - Heavy Equipment	EA	$1,815.23	2008	1.00	1	$1,815.23	8%	9%	MII	MII Assemblies	
A37B	Mobilization and Demobilization - Medium-Sized Equipment	Mobilization and Demobilization - Medium-Sized Equipment	EA	$686.14	2008	1.00	1	$686.14	8%	9%	MII	MII Assemblies	
A37C	Mobilization and Demobilization - Small Equipment	Mobilization and Demobilization - Small Equipment	EA	$216.20	2008	1.00	1	$216.20	8%	9%	MII	MII Assemblies	
A37D	Mobilization and Demobilization - Self-Propelled Equipment	Mobilization and Demobilization - Self-Propelled Equipment	EA	$1,381.66	2008	1.00	1	$1,381.66	8%	9%	MII	MII Assemblies	
A38A	Site Survey	Site Survey - Clean Area	DY	$462.08	2008	1.00	1	$462.08	8%	9%	MII	MII Assemblies	
A38B	Site Survey	Site Survey - Contaminated Area	DY	$994.48	2008	1.00	1	$994.48	8%	9%	MII	MII Assemblies	

CDM

CDM Federal Programs Corporation

PROJECT:	Libby OU1 Site	COMPUTED BY :	AS	CHECKED BY:	GH
JOB NO.:		DATE :	4/21/2008	DATE CHECKED:	4/28/2008
CLIENT:	USEPA			PAGE NO. :	1 of 1

Description: Determine cycle time for rigid frame truck required for short haul and long haul distances.

	Truck Trailer	
Type of truck (make and model):	---	
Hauling capacity (CY):	**28.0**	*MII Equipment Library*
	Track Loader	
Type of loader (make and model):	**CAT - 963C**	
Loader capacity (CY):	**2.6**	*Heaped (Ref: CAT Performance Handbook-31, Page 14-8)*
Load time (min):	0.1	*963C Travel Time, CAT Perf. Handbook-31, Page 14-16*
Maneuver time (min):	0.2	*963C Travel Time, CAT Perf. Handbook-31, Page 14-17*
Travel time, Empty (min):	0.2	*Assume 50ft, 963C Travel Time, CAT Perf. Handbook-31, Page 14-22*
Dump time (min):	0.1	*963C Travel Time, CAT Perf. Handbook-31, Page 14-17*
Number of bucket volume required to fill the truck:	11.0	*Truck capacity / Loader capacity*
Total loader travel time (min):	**6.60**	
Loader production output (CY/Hr):	130	*Means Productivity Std for Construction, 3rd Ed, 022.200.238.1300*
Loader production output for safety level C (CY/Hr):	55	*Assume 42%, EPA CE Guide (EAP 540-R-00-002), Exhibit B-4*
Loading time for one volume of load (min):	2.9	*Volume of 9.2 CY (Loader capacity)*
Number of bucket volume required to fill the truck:	11.0	*Truck capacity / Loader capacity*
Total loading time (min):	**31.9**	
Total loading time (min):	**38.5**	
	Cycle Time for Trucks	
	Hauling - Former Libby Vermiculite Mine	
Cycle distance (miles):	**26**	*Loaded + empty travel distance*
Truck average speed (MPH):	40.00	*Assumed*
Time required for travel (Hr):	0.7	*Loaded + empty travel time*
Truck loading at site (Hr):	0.6	
Truck unloading at landfill site (Hr):	1.5	*Assumed*
Total cycle time for long haul (Hr):	**2.8**	
Productivity per hour for long haul (CY/Hr):	**10.03**	

CDM Telephone Call Report

CDM

9200 Ward Parkway, Suite 500
Kansas City, MO – 64114
Tel: (816) 444-8270
Fax: (816) 523-2600

Project: Libby OU1 Site **Client:** USEPA / Volpe

Job No. **Date:** May 14th, 2008, 1220 Hr

☑ **Phone in** ☑ **Phone out** ☐ **Current Project** ☐ **Prospective Project/Marketing** ☐ **Administrative** ☐ **Other**

Made by/Received by: Abhay Sonawane

Talked with: Kootenai Paving

Subject: Price Quote for Asphalt Paving

Distribution:

- **Discussion:**

Company:
Kootenai Paving
1505 Us Highway 2 S
Libby, MT - 59923
(406) 293-6370

Asphalt Paving:

1. Asphalt - Surfacing Only - $3/SF
2. Asphalt - Base Course and Surfacing - $5.40/SF

- **Action Required (what, who, when):**

CDM Telephone Call Report

CDM

9200 Ward Parkway, Suite 500
Kansas City, MO – 64114
Tel: (816) 444-8270
Fax: (816) 523-2600

Project:	Libby OU1 Site	**Client:**	USEPA / Volpe
Job No.		**Date:**	May 14th, 2008, 1320 Hr

☑ **Phone in** ☑ **Phone out** ☐ **Current Project** ☐ **Prospective Project/Marketing** ☐ **Administrative** ☐ **Other**

Made by/Received by: Abhay Sonawane

Talked with: GRANITE CONCRETE CO INC.

Subject: Price Quote for Concrete

Distribution:

● **Discussion:**

Company:
525 Spencer Road
Libby, MT
(406) 293-3777

Concrete - Delivered:

1. Concrete - $89/CY
2. Fuel Surcharge for Each Truck - $10/Truck

● **Action Required (what, who, when):**

CDM Telephone Call Report

CDM

9200 Ward Parkway, Suite 500
Kansas City, MO – 64114
Tel: (816) 444-8270
Fax: (816) 523-2600

Project:	Libby OU1 Site	**Client:**	USEPA / Volpe
Job No.		**Date:**	May 14th, 2008, 1420 Hr

☑ **Phone in** ☑ **Phone out** ☐ **Current Project** ☐ **Prospective Project/Marketing** ☐ **Administrative** ☐ **Other**

Made by/Received by: Abhay Sonawane

Talked with: Bill Nemes, Montana Solid Rock Quarry

Subject: Price Quote for Riprap

Distribution:

- **Discussion:**

Company:
Highway 200,
Thompson Falls, MT
(509) 954-5362 (Cell) – Bill Nemes
(406) 827-9303 (Off)

Stone Rip-Rap: 18" to 24"

$67/CY – Delivered
$50/TON – Delivered

- **Action Required (what, who, when):**

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- Respiratory
- Specialized Kits
- Specialized Tools & Equipment for Remediation
- Spill / Leak Control
- Surface Preparation
- Traffic / Work Zone Safety
- Vacuums
- Closeout Items

VISA MasterCard

Checkout

Checkout Help

Required Date: 05/16/08

1 Item on Order

Qty	Unit of Measure	Item Description	Unit Price	Ext Price
1	rl (1)	ORANGE 4' X 100' BARRIER FENCE WITH 2" X 4" OPENINGS	30.210 rl	30.21

Subtotal	30.21
Estimated Freight	7.81
Total	38.02

** Total does not include taxes (if applicable) **

Comments

UPDATE STANDARD CHECKOUT

- To modify quantities, click Update.To remove a product from your cart, enter 0 in the Quantity Field, then click Update
- To check out, click on "Standard Checkout." You will be asked for additional information before your order is submitted.